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**INVESTIGATING AND PROVING
CONTEMPORARY FORMS OF CRIME:
SCIENTIFIC APPROACHES**

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IVANA BODROŽIĆ, PhD

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PREFACE

On the occasion of this distinguished anniversary of the International Scientific Conference “Archibald Reiss Days,” it is my great honor as Editor-in-Chief to address the scholar community gathered around this enduring academic forum. This anniversary represents not merely the passage of time but also the affirmation of a long-standing intellectual mission dedicated to the advancement of knowledge in the fields of law, security studies, political science, social sciences, criminalistics, forensic sciences and engineering, and computer science and information technology.

From its foundation, the conference has consistently provided a space where complex social phenomena, legal principles, political processes, and security challenges are examined with methodological precision and ethical awareness. In doing so, the conference has contributed meaningfully to the understanding of societies in transition and to the development of scientific thought that responds to both regional and global realities.

This conference has built its reputation over the years by contributing quality work and maintaining high academic standards. The presented research has reflected not only theoretical depth but also practical relevance – addressing issues of justice, governance, public security, human rights, and crime prevention. Such contributions underscore the vital role of these disciplines in shaping democratic institutions, safeguarding social stability, and promoting the rule of law.

This fifteenth anniversary is also a testament to the collective commitment of the academic community. The sustained success of the conference would not have been possible without the dedicated efforts of authors, reviewers, editors, and members of the organizing and scientific committees. Their professionalism and devotion to scholarly excellence have ensured the continuity, credibility, and growing influence of this conference across academic and professional circles.

As Editor-in-Chief, I wish to express my deepest appreciation to all contributors who, through their research and engagement, have enriched this forum and strengthened its academic legacy. I also extend sincere gratitude to our institutional partners and supporters whose trust and cooperation have enabled the conference to flourish over the years.

While this anniversary invites reflection on past achievements, it also calls us to look forward. The dynamic nature of social, political, and security challenges demands continuous scientific engagement, interdisciplinary cooperation, and intellectual courage. It is my firm belief that this conference will continue to serve as a beacon of scholarly dialogue, fostering research that is both critically grounded and socially responsible.

May this anniversary stand as a symbol of continuity, excellence, and shared purpose, and may the conference continue to inspire future generations of scholars to contribute thoughtfully and rigorously to the advancement of science and society.

Editor-in-Chief
Prof. Ivana Bodrožić, PhD

Ivana Bodrožić



I

KEYNOTE PAPERS



ARTIFICIAL INTELLIGENCE IN PERPETRATION OF CRIMINAL OFFENCES

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ABSTRACT

Purpose: Artificial intelligence is in huge expansion in recent years. It is therefore expected that its development will be significantly accelerated in the coming years, and that different forms of artificial intelligence will find their application in very diverse areas. What is also to be expected is that certain forms of artificial intelligence may be used for criminal purposes, in other words to commit criminal offenses either using AI or some of its forms. Various criminal legal consequences may arise from this, and the most complicated issue will be related to the determination of the form of responsibility for a criminal act committed independently by a certain form of artificial intelligence. This will be particularly interesting and significant when it comes to militarised forms of artificial intelligence, such as the various types of drones that are already used in current wars and armed conflicts. The criminal law analysis concerning such means may also refer to other conceptually and essentially similar combat means, such as submarine drones, ship/boat drones, armoured vehicle/other vehicle drones, etc. In addition, this analysis can even concern drone soldiers - as a special type of robots and a vision of artificial intelligence, which is still, at least to some extent, in the realm of science fiction, but it is very likely, practically certain, that the future will bring it. Such means can be used to commit crimes in ordinary life circumstances, not only in wars and armed conflicts.

As long as it is the man who manages the specific militarized form of artificial intelligence, it does not lead to major criminal law problems, as in this case the man is the perpetrator of the specific criminal act, and the form of artificial intelligence, such as a drone/unmanned aircraft, etc. is a mere means of committing a criminal offence. However, in some situations, which are probably a matter of the near future, it is possible to operate completely autonomous forms of militarized artificial intelligence, which would act independently of the direct influence of the people who created them, which leads to the need to develop new concepts of criminal responsibility for such situations. In certain situations, the criminal law concept of indirect perpetration could be implemented. This, however, would not be entirely adequate, because the immediate perpetrator would not be a man, i.e. a human being. It seems that this problem could be most adequately solved by extending the concept of command responsibility to these situations as well, which would require appropriate legal changes, that is, it comes down to the idea in the sense of *de lege ferenda*.

Design/Methods/Approach: In the introduction of the text the main characteristics will be explained of artificial intelligence connected with some possibilities of using AI for criminal purposes. The text will have the following basic parts: 1) Basic criminal law consequences of using artificial intelligence, 2) Forms of artificial intelligence as a means of committing a criminal offense or as a segment of the way of committing a criminal offense, 3) Forms of artificial intelligence as the creator of the criminal

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act, 4) Forms of artificial intelligence as generally dangerous means and an essential element of committing the criminal offense of causing general danger, 5) The use of militarized forms of artificial intelligence such as robot drones and the criminal law concept of command responsibility, 6) Some grounds for the exclusion of illegality and artificial intelligence, and 7) Conclusion that explains both the possibilities of applying the existing criminal law norms in relation to the use of artificial intelligence to commit crimes, and the need to observe the connection between artificial intelligence and criminal law at *de lege ferenda* level.

All common methods of research in the field of criminal law will be used, starting from the dogmatic method, normative method and comparative method.

Findings: Rapid development of AI in various areas of life will lead to its use in a whole range of life situations, including those which are legal and legitimate, the aim of which is to suppress crime even. However, there is, of course, the other side here as well, and therefore, the use of artificial intelligence for criminal purposes is no longer a matter of some distant and uncertain future.

As already hinted at (and probably their development is well under way), the routine use of various advanced forms of militarised artificial intelligence, such as fully autonomous drones, make it necessary to solve certain criminal law problems in relation to that issue, especially the form and basis of responsibility for international criminal acts, and above all war crimes, arising from the effect of such types of combat equipment. In this regard, the existing criminal law rules can only be applied to a certain extent, and only on the basis of a relatively broad, but still legitimate interpretation. However, in relation to some aspects of the action of drones as a form of artificial intelligence in war/armed conflict (and this basically applies to other types of artificial intelligence in the service of war/armed conflict, such as, for example, robot-soldiers, etc.), some specific and special criminal law rules should be prescribed, which would be relatively similar in some aspects and the existing/current conceptions of command responsibility.

Originality/Value: As it has already been noted, huge expansion of AI is expected in the nearest future. As it will lead to enormous social change and leave significant consequences, and probably be used for both good and bad, it is of utmost importance to analyse all relevant connections between the use of artificial intelligence for criminal purposes and the resulting criminal law consequences.

In general, from the use of artificial intelligence for criminal purposes, which means either as a means/tool of committing a criminal act, or as a specific 'perpetrator' of a criminal act, different criminal legal consequences can arise, and certainly the most complicated issue will be related to the determination of the form of responsibility for a criminal act that was independently committed by a certain specific form of artificial intelligence. Apparently, at the current level of development of criminal law, this issue can hardly be definitively explained in the *de lege lata* sense, but it can mostly be resolved at the *de lege ferenda* level, which will be given special attention in the text.

Keywords: artificial intelligence, criminal law, Criminal Code, criminal offense, indirect perpetration, command responsibility

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Milan Škulić, PhD, is a Full Professor and the Chair of the Criminal Law Department at the Faculty of Law, University of Belgrade. In 1999 he completed his doctoral thesis on the "Delinquency of the Juveniles – Criminal Procedural and Criminalistics Aspects". He teaches at the Faculty of Law, University of Belgrade, the courses of Criminal Procedural Law, Criminalistics, International Criminal Law, Organized Crime and Juvenile Criminal Law. At the Faculty of Law, University of Novi Sad, he



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INTRODUCTION

Artificial intelligence (AI) is in huge expansion in recent years. It is therefore expected that its development will be significantly accelerated in the coming years, and that different forms of artificial intelligence will find their application in very diverse areas. What is also to be expected is that certain forms of artificial intelligence may be used for criminal purposes, in other words to commit criminal offenses either using AI or some of its forms. Various criminal legal consequences may arise from this, and the most complicated issue will be related to the determination of the form of responsibility for a criminal act committed independently by a certain form of artificial intelligence. This will be particularly interesting and significant when it comes to militarised forms of artificial intelligence, such as the various types of drones that are already used in current wars and armed conflicts. The criminal law analysis concerning such means may also refer to other conceptually and essentially similar combat means, such as submarine drones, ship/boat drones, armoured vehicle/other vehicle drones, etc. In addition, this analysis can even concern drone soldiers - as a special type of robots and a vision of artificial intelligence, which is still, at least to some extent, in the realm of science fiction, but it is very likely, practically certain, that the future will bring it. Such means can be used to commit crimes in ordinary life circumstances, not only in wars and armed conflicts.

As long as it is the man who manages the specific militarized form of artificial intelligence, it does not lead to major criminal law problems, as in this case the man is the perpetrator of the specific criminal act, and the form of artificial intelligence, such as a drone/unmanned aircraft, etc. is a mere means of committing a criminal offence. However, in some situations, which are probably a matter of the near future, it is possible to operate completely autonomous forms of militarized artificial intelligence, which would act independently of the direct influence of the people who created them, which leads to the need to develop new concepts of criminal responsibility for such situations. In certain situations, the criminal law concept of indirect perpetration could be implemented. This, however, would not be entirely adequate, because the immediate perpetrator would not be a man, i.e. a human being. It seems that this problem could be most adequately solved by extending the concept of command responsibility to these situations as well, which would require appropriate legal changes, that is, it comes down to the idea in the sense of *de lege ferenda*.

BASIC CRIMINAL LAW CONSEQUENCES OF USING ARTIFICIAL INTELLIGENCE

Huge expansion of AI is expected in the nearest future, and it will lead to enormous social change and leave significant consequences, as well as that it will probably be used for both good and bad, it is of the most importance to analyse all relevant connections between the use of artificial intelligence for criminal purposes and the resulting criminal law consequences.

In general, from the use of artificial intelligence for criminal purposes, which means either as a means/tool of committing a criminal act, or as a specific 'perpetrator' of a criminal act, different criminal legal consequences can arise, and certainly the most complicated issue will be related to the determination of the form of responsibility for a criminal act that was independently committed by a certain specific form of artificial intelligence. Apparently, at the current level of development of criminal law, this issue can hardly be definitively explained in the *de lege lata* sense, but it can mostly be resolved at the *de lege ferenda* level.



Current legal frameworks are not equipped to hold an AI system directly liable, as they lack the human or corporate personhood required for criminal sanctions like imprisonment. Traditional legal concepts of criminal intent are challenging to apply to AI, as it lacks human consciousness and moral agency. While an AI's decision-making process might appear "malicious", it does not equate to human intent. Some propose solutions for addressing crimes committed by AI, such as creating specific "endangerment" offenses or using novel forms of punishment like deactivation, reprogramming, or destruction of the machine (Sachoulidou, 2024: 9).

Criminal law consequences of using AI primarily involve the criminal liability of individuals or corporations for harms caused by AI systems, such as negligence or failure to supervise, as well as the potential for discriminatory outcomes from biased AI. There are also complex legal questions about attributing criminal intent and responsibility to the AI itself, which is currently not possible under traditional legal frameworks.

AI as a perpetrator of a criminal offenses presents a significant legal issue and one of the most challenging questions in the law, precisely criminal law. Reforms in the field of criminal substantive law, as an exclusively legal mechanism for controlling crime, must be in accordance with the scope, dynamics and forms of contemporary crime, which are opposed by all forms of its politicisation in order to achieve political goals (Bodrožić, 2020: 393). But, "being late is no news for criminal law, and not necessarily a bad thing. Indeed, [t]he criminal law is and ought to be different – importantly dissimilar from other kinds of law" (Husak, 2004:211). From a regulatory perspective, the norms of criminal law represent "the *ultima ratio* in the legislator's toolkit" (Giannini, 2023: 46).

One thing is certain: regardless of whether legislators will address criminal law issues pertaining to AI-related misbehaviours in the short run or not, starting from 2019 the academic discourse on AI in the realm of criminal law has thrived. The ultimate proof of this excitement can be found in the fact that the International Association of Penal Law decided to dedicate its XXI International Congress in 2024 to the topic of "Artificial Intelligence in Criminal Justice" (<http://www.penal.org/en/information>).

Traditional concept of criminal liability worldwide under current legal frameworks proclaims that AI systems cannot be perpetrators of a criminal offence, because they lack legal personhood,² consciousness, and the capacity for *mens rea* (a "guilty mind" or criminal intent). Criminal liability is instead attributed to the human programmers, developers, manufacturers, or users behind the AI's actions.

Criminal responsibility refers to legal liability for a crime, requiring proof of a guilty act (*actus reus*) and a guilty mind (*mens rea*). It can be influenced by factors like intent, recklessness, and negligence, and can be mitigated or excused due to reasons such as diminished capacity or insanity. This responsibility is determined through the legal process to establish whether a person is liable to punishment for an offense.

In Serbian criminal legislation, guilt is one of the four mandatory elements in the general concept of a criminal offense, which means that in order for an action to be considered a criminal offense, it must be attributable to the perpetrator.

The Criminal Code (CC) of the Republic of Serbia defines the concept of a criminal offense in a new way, the basic element of which is precisely the subjective character - the guilt of the perpetrator. Therefore, according to the CC, guilt is understood in two ways, first as a subjective element of the

2 "AI criminal liability requires legal personhood for the AIs, and would be similar to corporate criminal liability that some legal systems are recognising. Corporate criminal liability is deemed to be a fiction; a construed form of liability where the corporation is attributed with its employee's acts. In contrast with corporations, AIs would be accountable for their own behaviour, not attributed with anyone else's. Even though it seems to be a simple solution not violating the rule of law requirements, it requires a more comprehensive assessment than this. But, as long as AIs do not think and act humanly or possess the capacities that imposing responsibility for acts in general requires, direct criminal liability for AIs are not a solution good enough to solve the liability problem of AI" (Claussén-Karlsson, 2017: 42-43).



concept of a criminal offense and secondly as a basis for the application of punishment and other criminal sanctions. Earlier Serbian criminal legislation did not use the term guilt, but the term criminal responsibility was mentioned.

Guilt essentially represents a central concept in criminal law, given that it is the basis and condition of criminal responsibility. In order for someone to be held criminally responsible, it is not enough just to have committed the act, but it is necessary that he is guilty of what he did or failed to do.

According to the CC, guilt exists if the perpetrator was sane and acted with intent, and was aware or was obliged and could have been aware that his act was prohibited. However, guilt can also exist when the perpetrator acted negligently, if the law expressly provides for it. Therefore, illegality also appears as an element of guilt. Awareness of illegality does not always have to exist; it is enough that there were a duty and the possibility to have such awareness.

As an example of the criminal law status of the AI as a perpetrator of the criminal offences in general, German criminal law will be highlighted, while the complete criminal law tradition in Serbia is based on the German legal tradition and criminal law concept.

Under current German criminal legislation (*Strafrecht*), AI cannot act as a perpetrator (*Täter*) of criminal offences.³ German criminal law is anthropocentric, meaning it only recognizes natural persons (humans) as having the capacity to commit crime. Key aspects of AI and German Criminal Law are primarily connected through the absence of legal personhood status: AI systems are considered property or tools, not legal persons with rights and duties. The lack of *mens rea*: criminal liability requires a “guilty mind” such as intent (*Vorsatz*) or negligence (*Fahrlässigkeit*), which AI lacks.

Human responsibility is the central place due to the fact that the liability is traced back to a human actor — the developer, manufacturer, or user — who exercised control or failed in their duty of care.

Within the current criminal law provisions in Germany AI cannot be understood as a “perpetrator” in the sense of a criminal offense, because it is not a natural person with the capacity of will and consciousness. Therefore, only natural persons or legal entities can be held criminally liable⁴ - for example: the programmer (e.g. in cases of manipulative programming), the operator or user, the responsible management, or in certain cases even the end user.

3 As of today, the German Federal Office for Information Security (*Bundesamt für Sicherheit in der Informationstechnik – “BSI”*) refers to the definition developed by the EU Commission's High-Level Expert Group on AI (HLEG) describing AI systems as “software and hardware systems that use artificial intelligence to act “rationally” in the physical or digital world. Based on perception and analysis of their environment, they act with a certain degree of autonomy to achieve certain goals”. A most comprehensive definition which comprises the main features of AI according to the most recurring definitions in the academic discourse due to A. Giannini is: “Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from these data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions. As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems)” (Giannini, 2023: 42).

4 For a long period of time Germany was lagging behind many European countries that have laws that provide for genuine corporate criminal liability (the United Kingdom, Ireland, The Netherlands, Norway, Iceland, France, Finland, Denmark, Slovenia, Switzerland and Belgium) because the dogmatic problems of where to place such liability within the existing system are as yet unsolved. It is likely that a solution will be most easily found along the lines of introducing corporate-specific sanctions rather than substantive criminal liability (Bohlander, 2009: 23). Under German civil law, legal entities can be held liable. German criminal law does not currently apply to legal entities, but their representatives can be criminally prosecuted. However, there are efforts to extend criminal law to legal entities to a certain extent (“corporate criminal law”) (Hackbarth, 2024: 69).



A comprehensive understanding of how artificial intelligence is treated in criminal law first requires establishing the specific nature and purpose of punishment, which must be critically examined and re-examined. The focus must be on the responsibility of individuals who use or develop artificial intelligence, or who provide data and storage space for them, thereby shaping the behaviour of artificial intelligence. Among other things, a significant problematic issue is the dilemma of how to make a choice between causing harm to one legally protected interest and protecting another, all in the context of the adequacy of introducing specific criminal offenses related to the violation of legally protected interests associated with artificial intelligence (Waxnegger, 2024).

The possible impact of the AI in the sphere of contemporary criminal law provisions carries with it concepts such as electronic personality, the determination and individualisation of criminal responsibility, ethics and autonomy, traditional criminal law, and the permissible risk of AI. It proposes to consider AI as a subject of law and explores the legislative challenges of including “digital personality” in the criminal legal system (Escalante-Huisacayna et al., 2024: 473-475).

*Forms of artificial intelligence as a means of committing
a criminal offense or as a segment of the way of committing
a criminal offense*

Some forms of computer-generated artificial intelligence find their application for criminal purposes, such as the use of specific concepts and methods of the so-called deep deception/deep falsification, as regards one's artificially created face, complete appearance, speech, behaviour, etc. Namely, these forms of a kind of “deep” (essential) deception or radical “faking” and the creation of “artificial reality”, i.e. “deep fake” achieved by using special and very complex computer programs and technologies with elements of artificial intelligence, are reduced to the creation of photos, video or audio material that in fact is a type of forgery, because it is not about a real, realistically existing person who is in the photo/video or who really does something speaks/pronounces (he expresses his original thoughts with his original voice), but it is an artificially realised imitation of a real person, which at first glance, when it comes to top creations of this kind, looks like a real/actually existing person, i.e. a voice is created that irresistibly resembles the voice of a concrete/original (real) person. Sometimes this can be fun, when it is done in some media as a type of specific “media game”, realised without malice, sometimes it can be just tasteless, or on the border of good taste when it comes to media content, and sometimes it can be very dangerous, and even of a criminal character, that is, it can serve as a means/method of committing certain criminal acts or by itself, be a certain criminal act.

Artificial intelligence is used in such a way, i.e. as a type of creation of “false reality” and “convincing appearance” (deep fake mechanism), most often for the execution of some criminal acts that have an element of forgery, sometimes also for certain types of blackmail, but also as an element of some computer and classic frauds. The “photomontage” itself, almost as old as photography itself, of course, found its application in the sphere of criminality, but never before the development of modern technology, based on the concept and systems of artificial intelligence, did it reach such a level of “perfection”, and this is especially noticeable when it comes to video material and voice/speech created by artificial intelligence.

All this, of course, is already finding increasingly expansive application in the sphere of committing some criminal acts, and in practice it is most often (therefore not limited to) the following forms of criminality of this type (Škulić, 2024: 472):

- 1) blackmail based on the creation of false photos/video materials/voices/speech of specific people, who are shown in such “images”, i.e. in such audio/video materials in a way that is embar-



passing for them or criminalises them (which may also have elements of the criminal offense of false reporting, evidence obstruction, etc.), destroys their reputation, etc.;

- 2) fraud, either computer or classic fraud, which is realised in different ways, such as the one based on fake voice appeals for providing financial assistance with an artificially created voice of a specific person, or artificial intelligence “creating” famous people (so-called celebrities), who in audio/video recordings invite citizens to pay sums of money for ostensibly humanitarian purposes, etc.;
- 3) identity theft using artificial intelligence, which is then used to commit/conceal other criminal acts;
- 4) creation of pornographic material using artificial intelligence (which, when it comes to our legislation, is a criminal offense in itself, only when the “actors” of such material are minors), in which case such recordings can also be used to blackmail real people, whose faithful “copies”, i.e. imitations created by artificial intelligence have become the actors of a pornographic video, or in such a way the reputation of people, who are business competitors or political opponents, is drastically ruined for any reason, because of hatred, a high degree of envy and other negative feelings (which is mostly in the sphere of pathology;
- 5) persecution of people and other forms of systematic harassment, sometimes connected with sexual crimes (Škulić, 2019: 357), most often on the Internet, by creating and broadcasting on social networks material that is offensive to them, or humiliates them, morally degrades them, grossly insults their honour and dignity, etc.;
- 6) the achievement of other criminal goals, with elements of a number of other criminal acts, such as the execution of either classic espionage or industrial espionage, thanks to the issuing of false orders/orders by the superior’s voice created by artificial intelligence to subordinates in a certain hierarchical chain, etc.

Finally, it is certain that the further development of the artificial intelligence system will quickly lead to further significant expansion of the field and the growth of opportunities for the use of various forms and types of artificial intelligence for the commission of criminal acts and, in general, for criminal purposes, so that the “list” of criminal acts that can be committed using forms of artificial intelligence, as well as the ways in which artificial intelligence can be used for criminal purposes, are certainly not of a limiting nature (Škulić, 2024a: 22-23).

Forms of artificial intelligence as the creator of the criminal act

When it comes to the subject, such as the so-called robot, which is characterised by artificial intelligence, then the basic question is how to solve the problem of responsibility for a criminal act that such a form of artificial intelligence “independently” committed. There are three basic ways of criminal law response to a criminal act created by some form of artificial intelligence, of which basically only one is acceptable in normal life circumstances, while none of them seems quite adequate for cases in war/armed conflict (at least not at the *de lege lata* level), this type of militarised artificial intelligence carries out a criminal act. There are the following ways to solve this problem:

- 1) treating a robot, which is a form of artificial intelligence, as a direct perpetrator of a criminal act, behind which, of course, a concrete “man” stands as an indirect perpetrator, who, using a drone, carries out his/her own criminal act;
- 2) treating a robot, which is a form of artificial intelligence, as a means of committing the criminal offense of causing a general danger or endangering the safety of air traffic, and sometimes some other criminal offense, when such a technical-technological means can be considered “generally



dangerous”, that is, suitable for endangering air traffic under certain circumstances and under certain specific conditions;

- 3) treating robots, which are a form of artificial intelligence, within the framework of the adapted concept of command responsibility, which would be possible only and exclusively at the *de lege ferenda* level and above all in relation to the use of militarised forms of artificial intelligence in war or armed conflict, when dealing with positive criminal law, not only in Serbia, but practically in most modern countries (Škulić, 2024a: 24; Škulić & Miljuš, 2024: 242-245).

*Forms of artificial intelligence as generally dangerous means and
an essential element of committing the criminal offense
of causing general danger*

Under certain conditions and in certain circumstances, the use of an unmanned aircraft in general, and especially its variant that represents a form of artificial intelligence, can constitute the act of committing the criminal act of causing general danger.

The crime of causing general danger prescribed by the provisions of Article 278 of the Criminal Code (CC) of Serbia is the central criminal offense of Chapter XXV of the CC, which concerns crimes against the general safety of people and property. The *ratio legis* of the incriminations contained in Chapter XXV of the CC, which is obviously particularly characteristic of the criminal offense of causing general danger (in which the aerial drone itself can be and is treated as a general dangerous tool), is explained in theory as follows: “Modern civilization and the development of technology have brought with them, in addition to the positive, a large number of negative phenomena that seriously threaten the safety of people and their property, so that although some ways of endangering that safety have always been known (e.g. fire), they also gain a new dimension with the development of technical means and technical achievements” (Stojanović, 2022: 242).

The possibility of treating a drone as a generally dangerous tool (which will be explained in more detail in the following text) comes from the very typical rapid development of technology for modern civilization, and it is based, among other things, on the justification that the legislator, after enumerating a series of generally “dangerous tools”, does not limit it, but in the end uses one general formulation in the form of – “any other generally dangerous actions or generally dangerous tool”.

The normative construction of the criminal offense of causing general danger is distinguished by the formulation of several forms of this incrimination. These are: 1) two basic forms, 2) two more severe forms, one of which is the most serious form of this criminal offense, as well as 3) one lighter form (Đorđević & Bodrožić, 2024: 259-260).

In addition, when some of the optionally defined (most) serious consequences occurred as a result of the commission of the crime of causing general danger, there will be a formal special crime (serious crime against general security), which in fact represents the most serious form of causing general danger, just as it has such significance with regard to some other criminal offenses from Chapter XXV of the CC.

The first basic form of the criminal offense of causing general danger exists when the perpetrator causes a danger to the life or body of people or to property of a larger scale by fire, flood, explosion, poison or poisonous gas, radioactive or other ionizing radiation, electricity, motor force or any other generally dangerous action or generally dangerous means.

In our criminal law theory, it is pointed out that when it comes to the act of committing the crime of causing general danger, “besides the explicitly stated actions, the general formulation also includes the undertaking of other generally dangerous actions, or the use of generally dangerous means, and



these can be very different actions and means, with the fact that in practice the most common cases are uncontrolled firing of firearms” (Stojanović, 2022a: 898).

In addition, the theory also notes that “a special problem that arises here, if a more serious consequence from Article 288 of the CC (serious crime against general security) has occurred is the demarcation with the criminal offense of negligent deprivation of life” (Stojanović, 2022a: 898).

An aerial drone in general, and especially one with elements of artificial intelligence, can certainly in certain circumstances be considered a generally dangerous tool, in other words a tool that, in some specific circumstances, can commit the criminal act of causing general danger.

Another basic form of the criminal offense of causing general danger exists when the perpetrator is an official or responsible person who does not install the prescribed devices for protection against fire, flood, explosion, poison or poisonous gas, radio-active or other ionising radiation, electricity or other dangerous means, or does not maintain these devices in proper condition or, in case of need, does not put them into effect or does not act at all according to regulations or technical rules on protective measures and thereby causes a danger to the life or body of people or to property of a larger scale.

The act of committing the second basic form of the criminal offense of causing general danger represents inaction - when there is a duty to act, i.e. it is a punishable omission, so this form has the characteristics of *delicta propria*, because only persons/perpetrators of a certain status (official/responsible person) can carry out this form of causing general danger.

Both basic forms of the criminal offense of causing general danger have the same consequence, which is causing/occurring danger, which is formulated alternatively: 1) for the life or body of people or 2) for property of a larger scale.

The first serious form of the criminal offense of causing general danger is qualified by the place of execution and it exists if one of the basic forms of this criminal offense is committed in a place where a large number of people are gathered.

Both the first and second basic form of the criminal offense of causing general danger are carried out when it comes to the form of the perpetrator's guilt with intent, and if the perpetrator committed the first basic form, as well as the qualified forms, out of negligence, then it is a minor form of the criminal offense of causing general danger.

The first and second basic forms of the criminal offense of causing general danger are threatened with the same punishment, which is cumulative: a prison sentence of six months to five years and a fine. For the first serious form of the criminal offense of causing general danger, a cumulative fine and a prison sentence of one to eight years are prescribed, while the second serious form of this criminal offense is punishable by a sentence of two to ten years in prison. For the lighter (privileged) form of the criminal offense of causing general danger, which is of a negligent nature, when it is a form of guilt, a sentence of up to three years of imprisonment is prescribed.

Article 288 of the CC prescribes serious offenses against general safety, when there are particularly serious qualifying circumstances, which are reduced to particularly serious consequences of specific criminal offenses against general safety, as regards causing general danger as a basic/central criminal offense of that type.

A serious crime against general safety exists in the following situations: A) if, as a result of the commission of the first or second basic criminal offense, i.e. the first serious form of causing general danger, the alternative occurs: 1) serious bodily injury to a person or 2) large-scale property damage, which is punishable by prison sentences of one to eight years; B) if, as a result of the criminal offense of causing public danger (either the basic form or one of the more serious forms), the death of one or more



persons occurred, when a prison sentence of two to twelve years is prescribed, C) if, as a result of the execution of the privileged (negligent) form of the criminal offense of causing public danger, serious bodily injury to a person or large-scale property damage occurred, which is threatened with a prison sentence of six months to five years, as well as D) if the death of one or more persons occurred as a result of the execution of a privileged (negligent) form of criminal offense of causing general danger, when a prison sentence of one to eight years is prescribed.

THE USE OF MILITARISED FORMS OF ARTIFICIAL INTELLIGENCE SUCH AS ROBOT DRONES AND THE CRIMINAL LAW CONCEPT OF COMMAND RESPONSIBILITY

The possibility of the emergence of an “army – robot”, which would possess artificial intelligence, or in the context of the main topic of this work, the massive use of drones with elements of artificial intelligence, in order to solve criminal legal problems concerning international crimes that would be autonomously and independently committed by such forms of artificial intelligence, could be most adequately solved if the rules arising from the criminal law concept of command responsibility would be adapted to this situation. In a formal sense, this could be done both in certain international legal acts, such as the Rome Statute on the establishment of the permanent International Criminal Court (ICC), as well as in national criminal legislation, whereby the principle of complementarity would apply in relation to the states that are parties/members of the Rome Statute.

Command responsibility is otherwise considered to be an “originally international criminal law figure”, derived from the Geneva Conventions, which found its place in the Rome Statute, and which is characterised by such a “model of attribution of responsibility”, based on the fact that the commander is responsible when criminal acts of his subordinates result from his failures of due/guaranteed supervision (Satzger, 2020: 401). According to the principle of complementarity, all member states/parties of the Rome Statute on the establishment of a permanent International Criminal Court are in their criminal legislation, and essentially, i.e. in a substantial sense, modelled on the normative solution from the Rome Statute itself, it introduced rules concerning command responsibility. Of course, it should be borne in mind that the implementation of such rules, i.e. the introduction of the concept of command responsibility into the national criminal legislation of countries that are parties/members of the Rome Statute, certainly does not have to be legally and technically identical to the rules of the Statute, i.e. the normative solution contained in the Rome Statute, and even that issue can be resolved both at the level of the general part of criminal law - as a special form of responsibility (as it is also regulated in the Rome Statute), and in a special part of criminal law - as a special criminal act of inaction, as it is, for example, the case in the German International Criminal Code (*Völkerstrafgesetzbuch VStGB*), but also in the Criminal Code of Serbia. The theory states that “the real reasons for the emergence and introduction of command responsibility should be sought in the fact that, as a rule, it is very difficult to prove that a superior ordered the execution of a criminal act” (Stojanović, 2017: 76).

The use of the concept/institute of command responsibility in relation to criminal acts arising from the action of unmanned aerial vehicles/drones as a form of artificial intelligence, and the same would apply to other militarised forms of artificial intelligence, would not be possible, of course, by any extensive interpretation of the existing rules relating to command responsibility, which basically, i.e. from the point of view of the essence of the rules of that type of responsibility (in some aspects essentially quite close to objective responsibility, which otherwise is not immanent in modern criminal law), reduces the responsibility of the commander for criminal acts committed by his subordinates, if before the execution of such criminal acts, he did not take the necessary measures to prevent them.



It is difficult to see in the contemporary literature dealing with international criminal law a position according to which command responsibility is explicitly treated as a form of objective responsibility, because it is not formally so, i.e. none of its forms is formally defined as objective responsibility. In essence, command responsibility is not, and of course, should not be a type of objective responsibility.

However, it seems that some forms of command responsibility are very close to objective responsibility, and that in practice, when it comes to those forms, they will probably really come down to objective responsibility. Of course, this is about a situation where the commander acts out of negligence, especially if in a specific situation it is about unconscious negligence (Škulić, 2002: 489-532).

Z. Stojanović points out “that part of command responsibility, where premeditation is missing, i.e. where only unconscious negligence is required, is incompatible with the nature of international criminal acts in the narrower sense, which are always premeditated (or more than that, like genocide)”, so there is “the absence of the necessary subjective attitude towards the committed act, as well as the absence of grounds to equate, in this case with regard to social-ethical reprimand, the superior who did not prevent the criminal act (for which he did not even know he was preparing) with the orderer, contrary to the principle of guilt in modern criminal law” (Stojanović, 2022a: 1137).

A similar concept to what is otherwise command responsibility in current international criminal law (Ristivojević, 2003: 188), as well as in most national criminal law systems (regardless of whether in certain criminal legislations it is a special form of responsibility as a general criminal law institution or a specific criminal act of inaction in the sphere of a special criminal law act) (Škulić, 2004), could also be applied when it comes to criminal acts resulting from the action of drones, i.e. in general, the consequences that could be criminal law/international criminal law relevant, which resulted from the action of armed/combat assets that are forms of artificial intelligence. Of course, this would only be formally possible if it were prescribed by a suitable source of law, which could be reduced to a single thought in the sense of *de lege ferenda*.

The institute of command responsibility is very interesting, because on the one hand, it represents a great novelty and a striking exception to the classic criminal law solutions on the basis of responsibility, and on the other hand, it practically enables the effective prosecution and sentencing of high-ranking military and political officials, which, according to the logic of things, always attracts a lot of attention, not only from the professional public, but from the public in general. Command responsibility basically and primarily owes its origin to the historically well-known case of the trial of the Japanese general Yamashita in Tokyo after the World War II, organized by the occupation forces of the USA (Škulić, 2023: 60-63). In addition, the introduction of that institute into national criminal legislation, especially in connection with the translation into that legislation of all relevant norms contained in the Rome Statute of the International Criminal Court, represents one of the most prominent examples of the concrete influence of international law on internal legal orders, in particular, the direct action of international legal rules in relation to national criminal law, mostly viewed in relation to concrete incriminations - the so-called international crimes.

The act of execution by the perpetrator who is responsible on the basis of command responsibility (Škulić, 2022: 163,167) as a specific form of extended responsibility is defined in the Rome Statute as an act of inaction, that is, failure to “do the duty”. As usual, with the delict of omission, the existence of a certain duty to act, which is violated, is required, so it is treated as a punishable omission (Wessels, 1996: 208). This is a true criminal offense of inaction, which is characterised by the violation of some norm that prohibits certain behaviour. Namely, the commander in a certain chain of command is obliged to perform a control function in relation to his subordinates, and represents a special type of guarantor regarding the behaviour of his subordinates, which must be in accordance with their military duties, and in particular, the commander is obliged to exercise a control function in terms of

preventing his subordinates from committing any of the criminal acts covered by the Rome Statute. The position of “guarantor”, which the commander has in terms of command responsibility, results from his competence in relation to his subordinates and his supervisory duties (Ambos, 2018: 200).

If a person holding a command function violates his obligation, which amounts to his refraining from the necessary preventive action, he is acting in an illegal manner, but the conditions for him to be held criminally responsible based on the rules on command responsibility are still not met. It is still necessary to fulfil certain objective and subjective conditions.

In an objective sense, it is necessary that the forces under his immediate command or supervision, as a result of his failure to exercise proper supervision, committed a criminal offense under the jurisdiction of the International Criminal Court. From a legal and technical point of view, the fact that some of the criminal acts under the jurisdiction of the International Criminal Court were committed by the subordinates is an objective condition for incrimination, i.e. punishment, although it is not formal-legal, because command responsibility in the Rome Statute is not conceived as a separate criminal act, but as one of the general grounds of criminal responsibility (in addition to other grounds of criminal responsibility). It is therefore a very specific legal-technical solution, which is associated with the objective condition of incrimination (punishability), which it essentially is in its effect, however, it does not refer to a specific criminal act of the commander, but to a special basis of his criminal responsibility, which gives it a *sui generis* character.

In the previously mentioned International Criminal Code of Germany (*Völkerstrafgesetzbuch - VStGB*), § 4 prescribes the criminal offense of responsibility of the military commander and other superiors (*“Verantwortlichkeit militärischer Befehlshaber und anderer Vorgesetzter”*).

In Article 384 of the Criminal Code of Serbia, there is a criminal offense of failure to prevent the commission of crimes against humanity and other goods protected by international law prescribed, which in terms of content is reduced to command responsibility (Đorđević & Bodrožić, 2024: 447-448).

Whether command responsibility is a special form of responsibility (as prescribed in the Rome Statute and in some national criminal legislations), or whether it was entered into the criminal legislation as a special crime of inaction/punishable omission, as its special form, the responsibility of commanders could be prescribed for criminal acts of the appropriate type (first of all, they would be war crimes), resulting from the action of drones/unmanned aerial vehicles as a form of artificial intelligence, i.e. in the future even “robot soldiers” and other possible forms of militarised artificial intelligence. The commander would thus be responsible for such criminal acts, just as he is normally responsible according to the concept of command responsibility for the criminal acts of his subordinates, when he previously failed to take measures that he could and was obliged to take to prevent the commission of a criminal act, and as a result, the specific criminal act was committed.

Finally, in accordance with the principle of guilt, the responsibility of the commander, as a special type of “guarantor”, who is responsible for his own inaction/punishable omission in relation to the action of drones as a form of militarized artificial intelligence (and essentially the same would be the case with other forms of such artificial intelligence, which humanity will probably encounter sooner or later in the future), would have to be of a subjective nature, which means that even in such a case it is necessary to show the appropriate form of the commander’s guilt.

In addition, it is also necessary that between the “action” of the commander, which means his failure to act/relevant inaction, and the criminal act resulting from the action of a militarised form of artificial intelligence, there is a corresponding cause-and-effect relationship.

It follows from this that such rules that would enable the responsibility of the commander for the criminal acts of this specific category of “subordinates”, who are not real human beings, but forms of



artificial intelligence in a combat function, would essentially be conceived similar to the rules in the domain of command responsibility, which otherwise concern the responsibility of the commander for the criminal acts of his “classic” subordinates, if in relation to his act of omission/punishable omission, by which he did not previously take the necessary measures to prevent the criminal acts of his subordinates, manifested the appropriate form of guilt, and when, between the relevant inaction of the commander and the criminal act resulting from the operation of a militarised form of artificial intelligence, there is a relevant and adequate causal link, i.e. cause-and-effect relationship.

SOME GROUNDS FOR THE EXCLUSION OF ILLEGALITY AND ARTIFICIAL INTELLIGENCE

The phenomenon of artificial intelligence, i.e. its various forms, is of primary importance when it comes to criminal law, both from the point of view of using certain types of artificial intelligence as a means of committing some criminal acts, and also with regard to the complete creation of “complete” criminal acts by artificial intelligence, which at the current level of development of criminal law, represents a great challenge, which in one part can mostly be solved in the sense of *de lege ferenda* (Škulić, 2024a: 32).

In addition, some other general criminal law institutes may be relevant when it comes to the operation of some forms of artificial intelligence. This particularly concerns two grounds for the exclusion of illegality. These are necessary defence and last resort, in respect of which one can reason on the basis of the general rules of criminal law. Therefore, if some form of artificial intelligence, which is not complete, but requires to be “under the supervision of a person”, such as a remotely controlled drone, is used as a means of simultaneous illegal attack, which is realised by a specific person who controls such a means, i.e. uses it for his own attack, there would be a right to necessary defence in relation to such an attack, when all other general criminal law rules concerning necessary defence would be applied. However, if it were (which for now, but probably not for a long time, is predominantly in the domain of science fiction), an attack by a certain type of artificial intelligence, where that form of artificial intelligence that acts completely autonomously and independently, would be the “attacker”, then the rules from the domain of necessary defence could not be applied, because the attacker is not human, but it would be treated as a danger, which can be eliminated in accordance with the general criminal law rules concerning extreme necessity

Nevertheless, certain dilemmas related to “defence” against drones and the possibility/impossibility of necessary defence as the basis for excluding illegality/the basis for excluding the existence of a criminal offense/responsibility for a criminal offense still exist today, as indicated by an example from recent German judicial practice, which is explained below, connected with the institute of the so-called defensive last resort in the civil-legal sense, and in the context of non-existence of responsibility for damage caused by the destruction/damage of someone else’s property. Directing the drone to fly over the area where another person lives, while recording/photographing that area from such a drone, which is shown on the “display” of the operator, i.e. the “remote pilot” of such a drone and possibly stored in databases, etc., represents an invasion of the private sphere of another person, which amounts to the existence of a criminal offense in the sense of § 201a StGB (*Verletzung des höchstpersönlichen Lebensbereichs und von Persönlichkeitsrechten durch Bildaufnahmen*). This is particularly noticeable, when the property is fenced and thus protected from unwanted views, and the drone overcomes everything, as it injures the privacy of the people on the property through aerial photography. In Germany, there was a specific judicial epilogue regarding this, when the Municipal Court of Rize decided on the possible responsibility of the accused who shot down a drone that violated his privacy from the air with an air rifle.



In the specific case, the drone flew over the defendant's property for a long period of time and harassed him, and after he verbally tried to influence the drone to move away, and failed to do so, he decided to use an air rifle, and from the second attempt, i.e. with a second shot, he managed to shoot down the drone, which the State Prosecutor's Office of Dresden treated as a criminal offense of damaging someone else's property (<https://www.anwalt.de/rechtstipps/strafbarkeiten-beim-fliegen-von-drohnen-208650.html>). However, the Municipal Court of Riza acquitted the accused, judging that he was justified in shooting down the drone, protecting his privacy.

Namely, with his action, the accused deliberately committed the crime of damaging another's property, but the specific action was not illegal, because there was a basis for excluding illegality, which is acting in self-defence, in accordance with the provisions of § 32 StGB. When it came to possible civil liability, there was none in the specific case either, because the person destroying the drone as someone else's movable property acted in a legally permissible manner, and in terms of the civil law provisions on the justification of defensive last resort (*Defensivnotstand*) in accordance with the provisions of § 228 BGB (Škulić, 2023a: 47-49).

INSTEAD OF FINDINGS – THE NEED TO OBSERVE THE CONNECTION BETWEEN ARTIFICIAL INTELLIGENCE AND CRIMINAL LAW AT *DE LEGE FERENDA* LEVEL

Artificial intelligence is obviously developing rapidly, and perhaps even rapidly, in various areas of life. There are serious hints that objects/subjects of artificial intelligence will begin to appear in a whole range of life situations, starting from fully autonomous cars, to robots-housekeepers, robots-TV presenters, and of course to robots-soldiers, robots-policemen, etc. There is a whole series of legal and legitimate ways and forms of using artificial intelligence, sometimes also with the aim of suppressing crime. However, there is, of course, another side here as well, and therefore, the use of artificial intelligence for criminal purposes is no longer a question of some distant and uncertain future, but it is still observed today in numerous areas, and it is certain that artificial intelligence will be used far more for criminal purposes in the future.

Law adapts, to a greater or lesser extent, to situations that arise in life, thanks to the rapid progress of technique and technology. This sometimes concerns criminal law as well. Therefore, some aspects of the criminal law reaction to some forms of artificial intelligence that could potentially be used for criminal purposes can now be thought of mainly in a *de lege ferenda* sense.

Today, unfortunately, the use of various forms of militarised artificial intelligence in current wars and armed conflicts is also very typical.

The question of the use of artificial intelligence is particularly interesting both in current wars/armed conflicts, and especially in relation to future wars and armed conflicts, but also in numerous normal and usual life circumstances in peace. As today, in the light of several recent wars/armed conflicts, and especially related to the current major war between Russia and Ukraine, various variants of unmanned aerial vehicles have experienced a huge expansion, which are now widely used in the current armed conflict in the Middle East, both by Israel and by its enemies, such means of combat are extremely interesting for various types of analysis, including from the point of view of criminal law.

As already indicated (and their development is probably well under way), the routine use of various advanced forms of militarised artificial intelligence, such as fully autonomous drones, it is also necessary to solve certain criminal law problems in relation to that issue, which especially concern the form



and basis of responsibility for international criminal acts, and above all war crimes, arising from the effect of such types of combat equipment

In this regard, the existing criminal law rules can only be applied to a certain extent, and only on the basis of a relatively broad, but still legitimate interpretation, but in relation to some aspects of the action of drones as a form of artificial intelligence in war/armed conflict (and the same basically applies to other types of artificial intelligence in the service of war/armed conflict, such as, for example, robot-soldiers, etc.), some specific and special criminal law rules should be prescribed, which would basically be relatively similar to some aspects and now existing/current conceptions of command responsibility.

When it comes to the use of militarised forms of artificial intelligence, i.e. aerial drones, there is a place for thinking in the *de lege ferenda* sense, which concerns the possible expansion of the concept of command responsibility and in relation to the operation of forms of militarized artificial intelligence, such as fully autonomous drones, and the so-called robot-soldier, which is still in the realm of futurism. Finally, when it comes to this, it is not certain if and when artificial intelligence will become so human-like that it will be difficult to distinguish between human thinking and machine reasoning. That is still a big question, but it is already quite clear that very soon various forms of artificial intelligence will find their place in our everyday life, as well as that some of their forms will find their destructive application in wars and armed conflicts, which poses great challenges to law in general, but criminal law in particular.

When it comes to the basic criminal consequences of using various forms of artificial intelligence in normal life circumstances, i.e. apart from war/armed conflict, certain forms of artificial intelligence can be, first of all, a means of committing certain criminal acts or can be an element of the way some criminal acts are committed, and in addition, such means can also be used to prepare certain criminal acts (Bodrožić & Milošević, 2023: 58-59), which is in principle punishable only when it comes to certain types of criminal acts, such as terrorism (Bodrožić, 2022).

This in itself does not represent any (too) big criminal law problem, because then, a certain type of artificial intelligence is “only” a tool or a “mere” means of committing a criminal act, which is used by a specific person as the perpetrator, who uses such means in an appropriate way. In addition, in itself, the use of some forms of artificial intelligence, such as autonomous aircraft/vehicles, can be a special criminal offense, when such a means is used first of all, the criminal offense of causing general danger, which of course, according to the logic of things, is possible and realistic only when it is not about war/armed conflict, but about normal life circumstances.

At the end it can be stated that traditional concept of criminal liability worldwide under current legal frameworks proclaims that AI systems cannot be perpetrators of a criminal offence because they lack legal personhood, consciousness, and the capacity for *mens rea* (a “guilty mind” or criminal intent). Criminal liability is instead attributed to the human programmers, developers, manufacturers, or users behind the AI’s actions.

Finally, when it comes to artificial intelligence, both the militarised one and the one that is otherwise used, i.e. used outside of war/armed conflict, some illustrative conclusions can be formulated based even on examples from science fiction and films of that kind like the last scene of the legendary movie “Blade Runner”. In the last dramatic sequence of that sci-fi film, the android who was created as a biological robot-soldier with a limited lifespan, feeling very deep emotions, otherwise typical only for humans, generously spares his mortal enemy, a cruel hunter of renegade androids, and gives him his life with a magnificent gesture.

These and similar scenes could become a reality with the appearance of robot-soldiers, but also with the use of this type of artificial intelligence in normal life circumstances, in relation to which the repre-



sented context of the criminal law aspects of the operation of some forms of artificial intelligence can be considered as very significant and current.

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THE CHALLENGES OF COMBATING CORRUPTION THROUGH SYSTEMIC/STRATEGIC APPROACH IN THE EU LAW

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ABSTRACT

Purpose: The purpose of this paper is to underscore the sluggish pace of corruption's conceptualisation, as governments have long been unable to comprehend its gravity and the catastrophic consequences it has on human rights and democratic systems. Conversely, it is a social and cultural phenomenon and a crime that needs to be combated on a global and local level. Despite the numerous regulatory measures implemented at the European and international levels, it still confronts many obstacles in its discovery and repression.

Design/Methods/Approach: The battle against corruption has now expanded to a global scale and, in the European regional context, has taken on systemic significance for the stability of the EU legal system itself. In light of this, this article will analyse the global response to the phenomenon/crime, with a particular emphasis on the European Union's stance, following a brief reconstructive meditation on the various forms of corruption. It will look at the Union's latest strategy, which combines internal and external action to combat corruption in order to take a systematic approach that safeguards the Union's and its Member States' democratic systems.

Findings: The findings will highlight the challenges of a crime that is affected by differing approaches across Member States, as evidenced by the difficult adoption of the Anti-Corruption Directive proposed by the European Commission in March 2023 and the subject of widespread debate in Member States. Its complexity necessitates a multifaceted approach, combining law enforcement and public authorities' efforts with social initiatives aimed at prevention and emergence of conducts.

Originality/Value: Its critical interpretation of the systemic/strategic approach that the European Union advocates in the fight against corruption is what makes the work unique and valuable. In actuality, this strategy needs to include the different legal traditions in the Member States' criminal justice systems. By acknowledging these, the analysis highlights how different legal orders and cultural attitudes towards corruption can influence the effectiveness of the EU policies

Keywords: abuse of functions, corruption, democracy, EU Strategy, UNCAC

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INTRODUCTORY REFLECTIONS ON THE CONCEPTUALIZATION OF THE CRIME OF CORRUPTION

The study of corruption reveals the absence of a clear-cut, widely accepted definition of what defines a corrupt act. This concept poses disciplinary, cultural, methodological, and regulatory issues that are the topic of continuous discussion among sociologists, economists, and jurists who study various facets of the phenomena (Gardiner, 2009). Undoubtedly, a criminal strategy that offers a thorough reconstruction of the different corrupt activities plays a crucial role in their suppression; yet, it is less successful when the analytical viewpoint is focused on preventing them, *i.e.*, anti-corruption measures (Poszgai-Alvarez & Bratu, 2025). In fact, the notion of corruption prevention cannot be confined to the categorisation of various criminal offences. In this sense, as underlined by the Council of Europe, “[n]o precise definition of corruption can be found which applies to all forms, types and degrees of corruption, or which would be accepted universally as covering all acts, which are considered in every jurisdiction as constituting corruption” (Multidisciplinary Group on Corruption, Programme of Action against corruption CM (96) 95, point 2: 14). Furthermore, “the concept of corruption is wider than that of criminal corruption. This differentiation is important for the simple reason that no comprehensive and all-embracing strategy in the fight against corruption can ever be formulated if one were to limit such measures to criminal corruption alone. Putting it differently, a corrupt practice or system might not as yet be considered by law an offence, but such an omission would not render it less corrupt in its character. It would only mean that under the current law or under a given system, no court may as yet be taken to suppress it – it is not considered to be a crime and, of course, no punishment can ever be meted out” (*ibidem*, point 17: 16). As a result, there is no widely agreed-upon definition of corruption; nonetheless, the most commonly used one characterises it as the abuse of the public authority or power that has been entrusted to an individual for personal gain. These advantages should be interpreted as both a financial gain and a rise in status or authority. It may be present or future, and it may involve other people who have some sort of connection to the individual misusing power (friends, family, interest groups, *etc.*). Public authority and power are exercised by elected politicians and public administration bureaucrats, while “abuse” encompasses both the pursuit of private interests at the expense of larger public interests and deviant behaviour with regard to formal tasks and duties associated with the public role held.

Nevertheless, corruption can be defined and classified in various ways: active and passive; grand corruption and petty corruption (Myint, 2000: 42–43). Political corruption is considered a type of grand corruption due to its severity and the high rank of the public officials involved (Heidenheimer & Johnston, 2009). As is well known, corruption can also be distinguished based on its public or private nature. The difference lies in the sectors in which the participants in the illicit activity operate. Public corruption involves a public official, whether national or foreign, as a party to the act of corruption, while private corruption involves only individuals in the private sector. More recently, a new type of corruption has been identified and much debated internationally: strategic corruption. It differs from other types of corruption in that in strategic corruption personal gain is present, at least for some of the actors, but it is not an essential component of the corruption system. The ultimate goal is to help the corrupt government influence the outcomes of its foreign policy, destabilising the States targeted



by this form of corruption (Roumegoux Rouvelle & Kowalewski, 2022). Furthermore, acts of corruption can be committed by commission or omission. A public official may refrain from acting or act in the exercise of his or her duties in exchange for an advantage from an individual or a company. Furthermore, the incidence of corruption varies across societies and can be rare, widespread, or systemic. Its causes can be economic-institutional, political-institutional, or even socio-cultural (Mauro, 1998: 13; Cartier-Bresson, 2000: 11–28). However, despite the difficulties inherent in its conceptualisation, there is unanimity of opinion on the unfavourable effects that corruption has on investments, especially foreign ones, on competition, on business activity, on government efficiency, but also on environmental quality, on human health and safety, on income distribution and interpersonal trust, and on respect for democracy and human rights (Hensgen, 2013: 197–219; Peters, 2019: 1251–1287; Racca & Cavallo Perin, 2014: 23–47). Additionally, despite numerous regulatory measures implemented at the European and international levels (Rose, 2015), corruption still faces many obstacles in its discovery and repression.

Given this, the present work intends to analyse the international response to the phenomenon - crime of corruption, with a particular emphasis on the European Union's stance. It will look at the Union's latest strategy, which combines internal and external action to combat corruption to take a systematic approach that safeguards the Union's and its Member States' democratic systems. The findings will highlight the challenges of a crime that is affected by differing approaches across Member States, as evidenced by the difficult adoption of the Anti-Corruption Directive proposed by the European Commission in March 2023 and the subject of widespread debate in Member States. In actuality, this strategy needs to include the different legal traditions in the Member States' criminal justice systems. By acknowledging these, the analysis highlights how different legal orders and cultural attitudes towards corruption can influence the effectiveness of the EU policies (Kaiafa-Gbandi, 2011: 7–34).

THE EMERGENCE OF THE PHENOMENON AT AN INTERNATIONAL LEVEL AND THE PROMOTION OF INTERSTATE COOPERATION ON THE MATTER

Corruption was long believed to be an issue that only existed in particular kinds of States and to be specific to certain States. On the contrary, a flurry of international corruption scandals drastically changed how the most developed nations viewed corruption. These incidents demonstrated that corruption was not just a problem in the underdeveloped nations but also in the developed democracies. Even in Western Europe, in the 1980s and early 1990s, corruption was initially considered a marginal or occasional problem, then it became an endemic issue to be addressed. Furthermore, globalisation has amplified the opportunities for corruption and made it more difficult to identify, also due to the new technologies and the emergence of offshore financial centres (Feathers, 2014: 287–292; McCoy & Heckel, 2001: 65–90). The phenomenon's significance on the global stage has also been aided by the increasing power of non-governmental organisations (NGOs), especially Transparency International, which introduced its Corruption Perceptions Index in 1995 (Borlini, 2019: 180–215).

Therefore, since the late 1990s, the fight against corruption has become the subject of international cooperation with the active involvement of non-State actors and international organizations, also thanks to the effort of some regional organisations (Rose-Ackerman & Carrington, 2013). With the specific reference to the European area, the Organisation for Economic Co-operation and Development (OECD) adopted the well-known Convention against Bribery of Foreign Public Officials (Pieth, Low & Cullen, 2007), as well as recommendations and reports that help member countries strengthen anti-corruption policies, monitor the effectiveness of measures, address new challenges such as new



technologies, and improve public integrity. Furthermore, the OECD provides analysis and support to combat corruption in the public and private sectors and oversees the implementation of its own recommendations. The OECD monitoring system is managed by the Working Group on Bribery in International Business Transactions (WGB), composed of experts appointed by the governments of participating countries. There is also the Organization for Security and Co-operation in Europe (OSCE) who supports as well the fight against corruption by promoting good governance, transparency, and international cooperation among participating States. It provides assistance to States to strengthen democratic institutions, improve anti-corruption legislation, and implement fair procedures in public procurement through the Office of the Coordinator of Economic and Environmental Activities (OCEEA) and the Office for Democratic Institutions and Human Rights (ODIHR). In addition, the Council of Europe has addressed corruption as a serious threat to democracy, the rule of law, and human rights. At the pan-European level, it is by far the most active organisation in addressing the phenomenon of corruption through its multidisciplinary approach, which is essentially based on the definition of European norms and standards. The Group of States against Corruption (GRECO), established in 1999 to monitor compliance with the Twenty Guiding Principles and the implementation of the Criminal Law Convention, the Civil Law Convention on Corruption, and two recommendations on codes of conduct for public officials and on the financing of political parties, also provides monitoring (Eser & Kubiciel, 2005; Rau, 2017: 444–460; Razavi Fard & Hassanpour, 2016: 47–58; Vannata, 2021: 182–198).

Globally, the problem of corruption was initially addressed through the United Nations Convention against Transnational Organised Crime (UNTOC), adopted in 2000 (Schloenhardt et al., 2023). However, the United Nations' commitment to combating corruption as a transnational phenomenon was formalised in 2003, with the adoption of the United Nations Convention against Corruption (UNCAC), which represents the first global agreement and the most comprehensive international instrument in the fight against corruption (Weilert, 2016: 216–240; Heimann, 2018: 103–116). The UNCAC preamble recognises that corruption is no longer a local issue but a transnational phenomenon that affects all societies and economies, making international cooperation essential to prevent and control it. It also recognises the seriousness of the problems and threats that corruption poses to the stability and security of societies, undermining the institutions and values of democracy, ethical values, and justice, jeopardising sustainable development and the rule of law. What makes the Convention unique is its holistic approach, which addresses the problem of corruption through a combination of preventive and repressive measures, involving the public and private sector, and civil society. Everyone has a crucial role to play in the fight against corruption. Hence, UNCAC provides implementation obligations for States Parties through preventive measures; prosecution, detection, and repression; international cooperation; asset recovery; and technical assistance and information exchange.

The adoption of international legal instruments has also led to the creation of various monitoring mechanisms to ensure their effective implementation, generally based on the “peer review” technique, *i.e.*, the systematic examination and evaluation of a state's performance by other states, with the ultimate goal of helping the state in question improve its policies, adopt best practices, and comply with the established standards and principles (Nicchia, 2014: 451–472). The UNCAC also provides a review mechanism for its signatories under Chapter VIII of the Convention. The Conference of the States Parties to UNCAC, held in Doha, Qatar, in November 2009, adopted the mandate for the review mechanism for the implementation of this Convention. However, the final outcome of a peer review is not binding. Furthermore, the UNCAC calls on Member States to consider criminalising certain offences, such as abuse of office, private sector corruption, influence peddling, and illicit enrichment, thus allowing states to have some discretion in their implementation.



THE MULTIPLE IMPLICATIONS OF THE FIGHT AGAINST CORRUPTION IN EUROPEAN UNION LAW

Compared to other international organisations, the European Union was late in defining its own strategy for combating corruption and, in fact, is still in the process of defining it. This is a consequence of the nature of its legal system, which did not provide for competences in the field. As is well known, the legal basis for the fight against corruption was introduced by the Maastricht Treaty on European Union (1992-1993) within the so-called Third Pillar on cooperation on justice and home affairs, which considered it a matter of common concern for the Member States. The methodology was intergovernmental in nature, and the regulatory instrument was the framework decision (Mitisilegas, 2008; Russo, 2024: 55–66). Corruption was initially considered a particularly serious threat to the financial interests of the Union with the adoption of the Convention drawn up on the basis of Article K.3 of the Treaty on European Union (TEU) on the protection of the European Communities' financial interests of 26 July 1995 and the Protocols thereto of 27 September 1996, 29 November 1996 and 19 June 1997 to establish minimum rules concerning the definition of criminal offences and sanctions in the area of fraud affecting the financial interests of the Union. It was noted that fraud affecting the Union's revenue and expenditure was in many cases not confined to a single country and was often committed by organised crime networks. Therefore, it was already recognised in the Convention that the protection of the Union's financial interests required the criminal prosecution of any fraudulent conduct affecting those interests (White, 1998). In parallel, Council Regulation (EC) 2988/95 on the protection of the European Communities financial interests was adopted to establish general rules on homogeneous controls and on administrative measures and sanctions concerning irregularities relating to the Union law, while referring at the same time to sectoral rules in that area, to fraudulent conduct as defined in the Convention and to the application of the criminal law and criminal proceedings of the Member States. Similarly, the convention on the fight against corruption involving officials of the European Communities or officials of the European Union Member States was adopted in 1997 on the basis of Article K.3(2)(c) TEU. Later, on July 22, 2003, the Council Framework Decision 2003/568/JHA on combating corruption in the private sector was approved. Additional anti-corruption provisions were adopted in respect to a number of areas, including procurement and money laundering (Parisi & Rinoldi, 2019: 385–424) until the most recent Directive (EU) 2019/1937 on the protection of persons reporting breaches of Union law (the so-called Whistleblowing Directive).

With the Treaty of Lisbon, the Union's competences in this area are expressly formalised, as the European area of freedom, security and justice of the Union becomes an objective that the Union aims to promote in order to ensure a high level of security, including the prevention and fight against crime and the approximation of criminal laws on the basis of Article 67(3) of the Treaty on the Functioning of the European Union (TFEU). The new Article 83(1) of the TFEU includes corruption among the forms of particularly serious crime with a cross-border dimension, thus granting the EU legislative powers to regulate it (Yakut, 2009: 1–52; Rozmus et al., 2014; Riza & Halili, 2016; Sicurella, 2021: 1–23). The fight against corruption thus becomes an internal-external objective, as the EU is committed to promoting good governance, prosperity, and fundamental values such as the rule of law not only among Member States but also with respect to third countries in its neighbourhood (European Parliament Resolution of 14 December 2011 on the review of the European Neighbourhood Policy (2011/2157(INI)), 2013/C 168 E/05) and, even more so, to the accession countries (Szarek-Mason, 2010). It is a priority for the governments of the acceding countries, where corruption continues to affect many sectors, from the judiciary to public administration and public procurement to the economy in general, including vulnerable sectors such as energy, healthcare, construction, and the media. However, corruption remains a problem within the Union as well. In this direction, the Rule of Law Report mechanism was created



precisely to address the democratic backsliding of Member States in four key areas, including the anti-corruption framework, and it has only recently been extended to Albania, Montenegro, North Macedonia, and Serbia. In fact, corruption undermines the very stability of the Union legal order and its identity, inherent in the values enshrined in Article 2 TEU (Ristei Gugiu, 2012).

THE NEED FOR A SYSTEMIC/STRATEGIC APPROACH

Thus, in May 2023, the Commission presented an Anti-Corruption Package, or Anti-Corruption Strategy (Szarek-Mason, 2010; Taseva, 2012: 344-362; Gaglio et al., 2023; Airey et al., 2023; Salazar, 2023; Salazar & Clementucci, 2023: 69-85). This package, adopted with a Joint Communication to the European Parliament, the Council, and the European Economic and Social Committee, reviews the existing legislation and policies in this area, highlighting how corruption is an integral part of nearly all organised crime activities, with 60% of organised crime using it to infiltrate the public or private sector. The stated objective is to strengthen the effectiveness of preventive and anti-corruption measures through a broader strategic approach. This involves complementing the existing actions with the development of new tools, both at the EU and Member State levels. At the same time, there is a commitment to combating corruption beyond the Union's borders and globally. Along these lines, the various measures presented in the Communication include a proposal for a Council decision on restrictive measures against serious acts of corruption, presented by the High Representative of the Union for Foreign Affairs and Security Policy (HR(2023)108), and a joint proposal for a Council regulation on restrictive measures against serious acts of corruption (JOIN(2023)13). The High Representative of the Union for Foreign Affairs and Security Policy, with the support of the Commission, proposes integrating into the instruments of the Common Foreign and Security Policy (CFSP) a regime of specific sanctions to combat corruption where acts of corruption seriously harm or threaten to seriously harm the fundamental interests of the Union and the objectives of the CFSP, as established by Article 21 TEU.

However, the most innovative aspect of the Communication is the proposed Directive on combating corruption (COM(2023) 234 final), which aims to harmonise Member States' anti-corruption legislation and make the criminalisation of various corruption offences mandatory (Zimmermann, 2024: 27-48; Bąkowski, 2024; Clementucci & Miekina, 2023: 276-279; Mongillo, 2023: 1-21; Izzo, 2025). The Directive, which will replace both the Framework Decision and the Anti-Corruption Convention and amend Directive (EU) 2017/1371, is intended as a unifying measure aimed at harmonising the institutions and legal instruments needed to prevent and combat corruption, given that the results achieved have been unsatisfactory. Anti-corruption laws, which are subject to national implementation, are not systematically applied with determination and incisiveness, highlighting the lack of effective political will to eliminate corruption (Rudik, 2020: 35-44) or the need for a broader view of good public governance (Merenda, 2025: 39-74). In this regard, the proposed Directive aims to harmonise national anti-corruption laws, including by extending them to cover crimes such as influence peddling, illicit enrichment, obstruction of justice, and abuse of functions, so as to make them mandatory under the EU law. It aims to strengthen sanctions, providing for more severe penalties for corruption offences, strengthen cooperation, improve collaboration between Member States' judicial and police authorities, and increase coordination between national authorities and the establishment of a new network of law enforcement agencies, thus creating a single and stronger legal framework for the public and private sectors. It also intends to promote preventive measures to foster a culture of integrity and ensure the protection of whistleblowers, supporting those who report corruption. However, the proposals leave room for discretion to Member States, which will have to transpose the



directive's content, ensuring the results are achieved and adapting their national legislation, including through reforms that guarantee the independence of anti-corruption authorities and promote best practices at the national level.

CRITICAL ISSUES RELATING TO THE CRIMINALISATION OF CERTAIN CRIMES: THE ITALIAN CASE OF ABUSE OF FUNCTIONS

Indeed, the implementation of the UNCAC's international instruments had already raised several critical issues regarding the criminalisation of certain crimes (Micheal, 2003; Babu, 2006). Prior to the presentation of the proposed directive, the European Commission's analysis found that Member States already included in their national legislation the crimes of corruption in the public and private sectors, embezzlement, misappropriation, obstruction of justice, and abuse of functions. However, definitions vary, particularly with regard to embezzlement or abuse of functions, or are significantly different from the relevant provisions of the UNCAC, or are only partially covered, as in the case of influence peddling. Furthermore, illicit enrichment was criminalised by only eight Member States, while other States included it in their legislation regarding money laundering or asset confiscation.

Similar critical issues arose during the negotiations for the adoption of the directive. At the proposal of the Italian government at a meeting held in June 2024, the Council of the European Union approved an amendment to Article 11 of the Directive, transforming the obligation to criminalise the abuse of functions into a mere option. The amendment adopted by the Council is significant, given that a heated debate has erupted among Italian scholars regarding the decriminalisation of the abuse of functions and the resulting regulatory vacuum. Specifically, the issue arose following the adoption of a law (no. 114 of August 9, 2024, known as the "Nordio Law", entered into force on August 25, 2024) that repealed Article 323 of the Italian Criminal Code on abuse of functions and amended the crime of illicit influence peddling (Garofoli, 2023; Gatta, 2024a; Manna, 2024; Mattevi, 2024). Then, the Italian government introduced the crime of embezzlement through distraction, involving the misappropriation of money or movable property by a public official (Gatta, 2024b).

The repeal of the crime of abuse of functions has led some national judges to raise the issue of constitutionality, such as the Court of Florence (Gatta, 2024c), which was the first to appeal to the Italian Constitutional Court, complaining that the repeal of Article 323 of the Criminal Code would raise doubts of constitutionality due to the failure to comply with the constraints deriving from international law (Articles 11 and 117(1) of the Constitution), with specific reference to Articles 7(4), 19, and 65(1), of the UNCAC, as well as the serious shortcomings in the protection of the proper functioning and impartiality of public administration (Article 97 of the Constitution). The Constitutional Court declared some questions inadmissible and others unfounded. Specifically, regarding the compatibility with the Convention's provision on abuse of functions, the Court ruled that the issue was unfounded. According to the Court, this provision merely establishes that States Parties are obliged to consider ("shall consider adopting") the criminalisation of conduct largely corresponding to that covered by the repealed provision of Article 323 of the Criminal Code. Unlike other provisions of the Convention that impose a specific obligation on States Parties to criminalise (in particular, Articles 15 and 16 on corruption, Article 17 on embezzlement, Article 23 on money laundering, and Article 25 on obstruction of justice), Article 19 simply configures – in the language of the Legislative Guide to the Convention, developed by the United Nations Office on Drugs and Crime (UNODC) – a "non-mandatory offence": that is, a conduct whose possible criminalisation States have a mere (procedural) obligation to "consider".



Ultimately, according to the Constitutional Court, nothing in the text or rationale of Article 19 of the Convention allows the conclusion that a State would be obliged to introduce (or maintain) in its legal system the criminalisation of abuse of functions. In the reasoning of the Court, the unequivocal text of the provision merely states an obligation to “consider” such an introduction to ensure the criminalisation’s compatibility with the general principles of the national criminal law, but also to carefully weigh the pros and cons of such an option. For the Court, in fact, each criminalisation option presents obvious advantages in terms of protecting the interests harmed by the conduct to be criminalised but also a wide range of disadvantages in terms of its impact on the fundamental rights of the recipients of the provision. In this direction, the Court concludes that the Convention has chosen to entrust the comparative assessment of the expected benefits and negative consequences of criminalising the abuse of functions to the prudent discretion of each State’s legislator (see Constitutional Court, judgement 3 July 2025, No. 95).

Therefore, the proposed amendment would merely replicate the UNCAC formula, which clearly distinguishes between crimes for which adoption is mandatory and those for which it is only optional. Additionally, the Court briefly discussed the compatibility of other more problematic crimes with the general principles of national law, such as illicit enrichment under Article 13 of the proposal, which is a crime in only eight Member States. Consequently, there will be application challenges in the successful implementation of the Directive into national legislations.

CONCLUSIONS BETWEEN EXPECTATIONS AND REALITY

In conclusion, the adoption of the proposed directive has sparked considerable enthusiasm among professionals due to the high expectations for its implementation. Conversely, some Member States, such as Italy, but also Ireland, Portugal, and Sweden, have expressed negative opinions on certain parts of the proposal, complaining of a potential conflict with national legislation and interference with national sovereignty through definitions and sanctions that do not conform to their own legal tradition. Thus, the Swedish Parliament deemed that certain provisions of the proposal violate the European Union’s principles of subsidiarity, undermining the independence and autonomy of national legislation and going well beyond the objectives set by the European Commission. More specifically, the Swedish Parliament criticised the inclusion of a ban on running for elected office among the additional sanctions of termination or disqualification from public office for those convicted of corruption offences. According to the Swedish Parliament, the EU’s legislative competence in criminal law would thus extend to establishing the conditions for democracy in national elections in Member States. However, given the above, the issue over which the majority has resisted is the abuse of functions. The potential conflict between European provisions and Italian reform has already been highlighted by the European Commission in its Rule of Law Report. Furthermore, the proposed directive also contains provisions that are already covered by other crimes in Italy. For example, it requires the introduction of abuse of functions in the private sector, an area already protected by other provisions, such as private corruption and financial disloyalty, as well as aggravated embezzlement. Furthermore, the proposal establishes specific limitations, maximum and minimum penalties, and statutes of limitations to be implemented in judicial systems that, however, differ among Member States. Furthermore, the proposal’s broad and vague definitions, such as “unfair advantage” or “public interest”, could be interpreted differently in the Member States, entailing uneven application and legal uncertainty. Finally, the risk of political abuse cannot be ruled out: in countries where the judiciary is not fully independent, the new rules could be used selectively.



Aside from criticism and opposition from Member States, the text of the Directive itself contains significant gaps, for example regarding preventive measures, as the Commission refused to establish common minimum standards for the main factors that favour corruption (corruption facilitators). The lack of common minimum standards on lobbying, revolving doors, or reporting obligations effectively obstructs any attempt to harmonise national legislation on key corrupt practices, creating a regulatory patchwork that is often inconsistent and negatively impacts the functioning of the internal market. Furthermore, in many Member States, the competent authorities lack sufficient resources (human, financial, or technological) to effectively enforce the Directive. The rules thus risk remaining merely on paper or being applied ineffectively. The national transposition process is often slow and uneven, resulting in disparities in actual implementation across countries. Furthermore, public bodies, and particularly small and medium-sized enterprises, will be affected by new compliance requirements, such as internal whistleblowing systems, anti-corruption controls, and ethics audits, which will require time-consuming transposition and implementation and will increase bureaucracy.

Finally, the Directive has entered the critical phase of interinstitutional negotiations, where the positions of the European Parliament and the Council are very distant, with a clear conflict between expectations and reality. So much so that on June 2, 2025, 57 civil society organisations, including Transparency International, published an open letter calling on the Council of Ministers and the European Parliament to support and strengthen the anti-corruption measures adopted by the European Parliament as part of the proposed EU Anti-Corruption Directive. The signatories call on the EU leaders to demonstrate genuine political will to fight corruption and establish higher standards of integrity and accountability across the Union. All this demonstrates that any systematic/strategic approach to fighting corruption has strong political implications because it involves defining strategic political objectives, adopting plans, and modifying administrative and personnel structures that affect the established interests. The fight against corruption takes the form of policies that define government priorities, influence the appointment of officials, and require transparency and impartiality in public decision-making. Therefore, despite European legislation, the fight against corruption remains largely the responsibility of Member States, especially in terms of implementation.

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THE CONNECTION BETWEEN ENVIRONMENTAL CRIME AND CORRUPTION¹

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ABSTRACT

Environmental crime brings big profits to organized criminal groups. This is especially present in the area of trade in illegal waste. In doing so, the legal sector is often used in order to make a profit in an illegal way. The connection with corrupt activities is particularly pronounced due to the transnational nature of environmental crime. Corrupt public officials and weak institutions and state bodies responsible for various issues in the field of environmental protection additionally contribute to this. As some of the examples of corruption in the field of hazardous waste disposal, corruption in the procedure of licensing waste disposal facilities or granting a permit for transporting hazardous waste can be cited. In addition, in the process of detecting illegally dumped waste, regulators can be offered incentives to ignore illegal dumping.

Criminal acts against the environment cause enormous damage to the environment, thus endangering the life and health of citizens. Therefore, corruption in the field of environmental protection can be considered particularly dangerous. That is why it is necessary to take preventive measures, especially in the field of corruption prevention. This attitude is also expressed in the new Directive on environmental protection through criminal law 2024/1203.

Purpose: The aim of the paper is to point out the emerging forms of corruption in the field of environmental protection, as well as the need for its prevention. Considering that the Republic of Serbia needs to harmonize its legislation with Directive 2024/1203, it is necessary to keep in mind that this does not only imply harmonization of the provisions of criminal procedural and substantive legislation but also other regulations that prevent corruption. Considering that the aforementioned directive emphasizes the importance of whistleblowers in the field of environmental protection, it is necessary to improve their position through national legislation.

Design/Methods/Approach: Apart from the introductory part, which indicates the causes and phenomenology of the environment, the paper analyzes the content of both the Europol and Interpol reports, as well as Directive 2024/1203 on environmental protection through criminal law. However, in that part we focus exclusively on the connection between corruption and environmental crime, with the aim of providing recommendations for its prevention in the aforementioned area.

Findings, Originality/Value: Based on the analysis, we try to give recommendations for harmonizing national legislation but also practices with European standards in the field of combating corruption related to environmental crime.

Keywords: *environmental crime, corruption, prevention, harmonization, improvement.*

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INTRODUCTION

In recent years, environmental crime has brought increasing profits to organized criminal groups. There are several characteristics of environmental crime. According to the authors, these are massiveness, dynamism, constant expansion, and the foreign element (Jovašević, 2006: 102). Environmental crimes are often perceived as victimless crimes. This can be one of the reasons for the lack of an adequate response from the competent institutions. However, the consequences of this type of criminality are very negative for the whole society (Banks et al., 2008: 1; Matić Bošković & Kostić, 2023: 75).

A large number of criminal acts against the environment remain undetected. This not only has negative consequences on people's lives and health but can additionally encourage the commission of such activities (Bodrožić, 2014: 72; Kostić, 2024: 215).

A very long period of time can pass between the commission of a criminal offense against the environment and the moment of its discovery. That is why there is less chance that adequate evidence will be provided for criminal proceedings and prevent the occurrence of further harmful consequences for people's lives and health. For the detection of these criminal acts and the timely provision of evidence, the role of persons who possess certain knowledge and experience in the field of environmental protection is important. Those persons certainly mean whistleblowers, who need to be provided with adequate protection in order to encourage them to inform the competent institutions about illegal activities that they have identified during the performance of a certain duty or work (Kostić, 2024: 217; Kostić, 2022).

Crimes that can be considered environmental crimes are very dangerous in themselves. They cause severe damage to the environment and thus threaten the health and life of citizens. If they are related to corruption, their consequences can be more far-reaching, because such actions can make it impossible or difficult to detect those criminal acts. Transparency, assessing the risk of corruption, and taking preventive measures in the area of environmental protection would be significant from the aspect of preventing environmental crime. It is precisely the need to undertake preventive measures that is cited as one of the significant activities in the field of environmental crime suppression in the Directive on environmental protection through criminal law 2024/1203 (Stojanović & Bodrožić, 2025).³

The aim of the research in this paper is to indicate the connection between environmental crime and corruption and to provide recommendations for improving the approach in combating criminal acts against the environment.

³ Directive (EU) 2024/1203 of the European Parliament and of the Council of 11 April 2024 on the protection of the environment through criminal law and replacing Directives 2008/99/EC and 2009/123/EC. The text of the Directive is available at <https://eur-lex.europa.eu/eli/dir/2024/1203/oj/eng>.



RESEARCH METHODS

In this paper, we start from the assumption that in practice there is a very common connection between environmental crime and corruption, even in the case of illegal logging, which is often considered the so-called petty crime. In addition, the type of environmental crime, and therefore the phenomenology of corruption associated with it, depends on the geographical characteristics of a particular climate. Therefore, when assessing the risk of corruption in the field of environmental protection, such elements must also be taken into account.

Apart from the introductory part, which indicates the state and challenges in the field of the suppression of environmental crime, the paper analyzes the content of various international documents and reports. Bearing in mind that a new Directive on the protection of the environment through criminal law was adopted in 2024, special attention in this paper is devoted to the analysis of its content, which indicates the connection between corruption and environmental crime, as well as the provisions that prescribe obligations for member states to establish measures through their national legislation that will improve the way of suppressing criminal acts against the environment.

STATE AND CHALLENGES

The increased number of activities to the detriment of the environment caused the imposition of criminal sanctions for serious violations of regulations in the field of environmental protection. However, the mere prescription of criminal offenses in itself does not mean effective criminal protection if sanctions are not applied to the perpetrators. Due to the specificity of the way of committing crimes against the environment and the seriousness of their consequences, the criminal prosecution of the perpetrators is particularly challenging and requires an adequate level of cooperation between the public prosecution and other state authorities and institutions, as well as civil society organizations. However, a special problem is the connection between corruption and environmental crime. This makes it more difficult to detect crimes against the environment but also to prove their existence, while the consequences of such crimes are still present and pose a danger to people's lives and health (Barone & Masciandaro, 2023: 5).

In her research, Batrićević points out that the human right to a healthy environment is often violated by multinational corporations that knowingly do so with severe consequences for the environment, life, and health of people, while at the same time endangering plant and animal species (Batrićević, 2017: 244). Pointing out the problems of environmental crime related to protected animal species, she points to the possibility of connection between criminal structures and state officials during the import and export of protected animal species. In such situations, it is possible to allow or enable the perpetrators to transport these animals without the necessary permit or to allow the falsification of documents with adequate monetary compensation. Corrupt activities that enable the execution of such criminal acts can consist of the conscious and deliberate absence of control by the persons authorized to do so, with prior or subsequent bribery to persons authorized by law to exercise control (Batrićević, 244).

As an example of the connection between environmental crime and corruption, we can cite a case from Brazil in which high-ranking government officials were linked to illegal logging in the Amazon. The estimated damage was around 500 million US dollars (Duri, 2020: 6). The connection between corruption and environmental crime was also noted in Honduras, where politicians, timber companies, mayors, and transporters were involved in the execution of criminal acts against the environment. In connection with these activities, timber auctions were set up, stock valuations were manipulated, and license abuse and document falsification were recorded, as well as police and checkpoint bribery.



Employees of the Honduras Forestry Development Corporation were also linked to corrupt activities in order to facilitate illegal logging (Duri, 6).

The type of environmental crime, and therefore the method of execution, is specific to each geographical area. So, for example, due to illegal fishing, the decline of Ohrid trout and whiting in Lake Ohrid, which is located on the border between North Macedonia and Albania, was recorded. Media reports regarding these activities often linked these activities to corruption. According to some analyses, corruption related to such activities is widespread, as various agreements are often made to allow the authorities to be absent during poaching (Agović, 2025: 15). In Montenegro and Bosnia and Herzegovina, there is illegal damage to forests, which is associated with unauthorized construction or money laundering through construction works. The undertaking of such activities is conditioned by corruption and an insufficient number of employees in the state administration and competent inspectorates (Agović, 10).

International cooperation is very important in the detection of environmental crime and related corrupt activities. Thus, at the request of the Italian judiciary, Eurojust supported the activities in which Slovakia and Hungary participated in order to suppress criminal acts related to the sale of scrap metal. On that occasion, 15 suspects were arrested in Italy and Slovakia for illegal trade in metal waste, money laundering, and issuing false invoices and documents. Those persons created false certificates and invoices, in which the waste was presented as old metal packaging. According to the Guardia di Finanza, over 18,000 tons of scrap metal were illegally sold and processed in legal foundries.⁴

According to the SOCTA report for the year 2025, in the area of environmental crime, the illegal import of hazardous waste without any treatment is increasingly prevalent. Most of the persons engaged in this activity are owners of legal businesses that undertake illegal activities in order to gain additional profit. Operating from the legal sector allows them to establish new trading companies while taking control of the waste management chain. Corruption and issuance of false documents enable such legal entities to carry out illegal activities. Intermediaries who connect waste producers with disposers play an increasingly important role in this chain of illegal trade. They make it possible to obtain false permits and documents while increasing the price of waste, taking part of the commission, or wrongly writing off the waste (EUROPOL, 2025: 65). Illegal wildlife trade is a very common form of environmental crime. According to EUROPOL data, the criminal networks associated with these activities include an increasing number of experts in the field of veterinary medicine, chemistry, and biology, who may also be involved in organized criminal groups engaged in these activities (EUROPOL, 66).

The increasing connection of environmental crime with organized crime and corruption requires a different approach, which implies the application of adequate measures. The need for this is also expressed in international documents that contain recommendations and prescribed obligations for states to establish effective mechanisms for environmental protection and prevention of crimes that threaten it at the national level.

THE CONNECTION BETWEEN ENVIRONMENTAL CRIME AND CORRUPTION IN INTERNATIONAL DOCUMENTS

Corruption in the field of environmental protection has existed for a very long time, and it is conditioned both by problems in sectoral management and by inadequate regulations in certain areas governing the field of environmental protection. In addition, the obstacles in its suppression are also the

⁴ European Union Agency for Criminal Justice Cooperation, Massive metal waste fraud in Italy halted with Eurojust support, 10 March 2021, Press Release, <https://www.eurojust.europa.eu/news/massive-metal-waste-fraud-italy-halted-eurojust-support>.



shortcomings that exist in the judicial system. That is why the need to improve the cooperation of the non-governmental sector, private, and public sector has always been emphasized. In addition, at the national level there is a need to link anti-corruption strategies with other environmental protection strategies (United Nations Office on Drugs and Crime, 2012: 51). This is exactly the attitude expressed in certain international documents.

The goal of adopting the Convention on International Trade in Endangered Species of Wild Fauna and Flora was to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. However, years after its adoption, the connection between corruption and the illegal trade in specimens of wild animals and plants was recognized. This is emphasized in CITES Resolution 17.6 on the prohibition, prevention, detection, and suppression of corruption, which facilitates activities that are carried out in violation of the mentioned Convention. The document emphasizes the existence of failures in connection with the prevention and suppression of corruption, which reduces the effectiveness of the implementation of the Convention. Therefore, the signatory countries are invited through the Resolution to take measures to prohibit, prevent, detect, and suppress cases of corruption, as well as to ensure that any activity that constitutes corruption, which is related to the administration, implementation, or application of the CITES Convention, is sanctioned. In addition, all CITES administrative authorities are invited to cooperate with national anti-corruption bodies, judicial authorities, and relevant civil society organizations when implementing preventive measures at the national level.⁵

The connection between corruption and environmental crime was also pointed out in the Resolution of the Conference of Member States of the United Nations Convention against Corruption No. 8/12. In the mentioned document, the concern of the signatory countries of the Convention was expressed due to the connection between corruption and criminal acts against the environment. The Resolution highlights the importance of the role of the media, civil society, the academic community, and private sector entities as one of the effective mechanisms for preventing corruption related to crimes against the environment.⁶

In addition, bearing in mind the lucrative motive of perpetrators of criminal acts to the detriment of the environment, the importance of restitution of property acquired through the commission of criminal acts in accordance with the provisions of the United Nations Convention against Corruption (point 3 of the Resolution) is emphasized. In order to combat corruption related to environmental crimes, contracting states should use all relevant legal mechanisms available at national, regional, and international levels. In this context, the Resolution emphasizes the importance of applying financial investigation techniques and special investigative actions, as well as the importance of protecting whistleblowers (point 12).

Within point 28) of the preamble of the Directive on criminal protection of the environment from 2024, the mutual connection between corruption and environmental crime is emphasized. Therefore, during criminal proceedings and trials, one should take into account both the participation of organized criminal groups in the execution of criminal acts to the detriment of the environment, as well as the possibility of corruption, money laundering, cybercrime, etc. In addition, the frequent connection of such forms of criminality with serious crimes against the environment was emphasized, bearing in mind that frequent failure of supervision or untimely or complete absence of taking measures after the supervision by persons performing their public duty can be associated with corruption that enables the commission of criminal acts against the environment. As some of the activities of civil servants

5 Conf. 17.6 (Rev.CoP19), Prohibiting, preventing, detecting and countering corruption, which facilitates activities conducted in violation of the Convention, <https://cites.org/sites/default/files/documents/COP/19/resolution/E-Res-17-06-R19.pdf>

6 United Nations Office on Drugs and Crime, Corruption and Economic Crime Branch, Resolution 8/12 Preventing and combating corruption as it relates to crimes that have an impact on the environment, <https://www.unodc.org/corruption/en/cosp/conference/session8-resolutions.html#Res.8-12>.



that can be related to criminal acts of corruption and that facilitate the execution of criminal acts against the environment, they can be issuing illegal licenses or issuing falsified or untrue reports on the state of the environment.⁷

Although it does not regulate in detail the area of whistleblower protection because it is the subject of another directive, the Directive on Criminal Law Protection of the Environment from 2024 emphasizes the importance of the role of whistleblowers who are in contact with a certain legal entity, i.e., organization, during the performance of their work activities, because they are the first to learn about threats or damage to the public interest and the environment.

They should be adequately motivated to report illegal actions in a timely manner in order to prevent the occurrence of greater and more serious consequences for people's lives and health. The role of the whistleblower is particularly important when it comes to discovering the so-called "greenwashing", which means the false presentation of products, services, and business operations of companies as harmless to human life and health (de Freitas Netto et al., 2020: 6).

In this context, member states should take the necessary measures to ensure that all persons who report criminal acts against the environment or otherwise provide evidence or cooperate with competent authorities have adequate support and assistance in the context of criminal proceedings and in accordance with national legislation (Article 14 of the Directive).

The connection between corruption and environmental crime is also recognized in the provision of the Directive according to which member states should ensure that effective and proportionate investigative tools that are available for the investigation and prosecution of perpetrators of crimes that can be considered organized crime or other serious crimes should also be used during the investigation and prosecution of perpetrators of crimes against the environment (Article 13 of the Directive).

As can be concluded in international documents, the connection between environmental crime and corruption is increasingly pointed out. All of them emphasize the importance or foresee the obligation to apply the same measures, such as the application of special investigative techniques, the return of property resulting from the commission of a criminal offense, and the effective protection of whistleblowers, as well as the use of the knowledge and skills of civil society organizations.

Cooperation with civil society organizations in the field of environmental protection and institutions authorized by law to combat environmental crime can be of great importance, bearing in mind not only their professional but also technical capacities (Committee of Lawyers for Human Rights, 2025: 8). In addition, their knowledge and experience can help when conducting an investigation into the possible connection of environmental crime with corruption and organized crime.

CONCLUSION

In recent years, at the international level, there has been an increasing awareness of the connection between corruption and environmental crime. Such activities pose a great danger to the life and health of people. The presence of corruption in connection with environmental crimes makes it difficult to detect and prove those crimes and, therefore, to apply sanctions against their perpetrators. That is why a large number of these crimes remain undetected, regardless of the fact that the national legislation prescribes adequate criminal sanctions for their perpetrators.

⁷ Directive (EU) 2024/1203 of the European Parliament and of the Council of 11 April 2024 on the protection of the environment through criminal law and replacing Directives 2008/99/EC and 2009/123/EC. The text is available at <https://eur-lex.europa.eu/eli/dir/2024/1203/oj/eng>



Bearing in mind the reports of EUROPOL, it seems that organized criminal groups that are engaged in committing criminal acts against the environment are increasingly using the knowledge and assistance of persons who possess special experience related to environmental protection. Therefore, the suppression of these criminal acts requires a new and more comprehensive approach, both at the national and international levels.

Considering the increasing sophistication in committing criminal acts against the environment, it is necessary to apply a series of preventive measures. Some of them are monitoring access to the register of beneficial owners of natural persons by various institutions. In addition, it is necessary to establish cooperation between administrative bodies dealing with environmental protection, police, the public prosecutor's office, and the civil and private sectors, as well as national bodies responsible for combating corruption, with the aim of timely exchange of information.

Strategies for the prevention of corruption at the national level should be linked to strategies in the field of environmental protection, while the risk of corruption should be assessed depending on the sector and geographical characteristics of a certain geographical area.

Taking into account the practice so far, it seems that criminal acts related to the illegal trade in hazardous waste and materials are most often associated with corruption. Therefore, at the national level, the obligation to conduct a financial investigation should be prescribed for those criminal acts.

In connection with crimes against the environment, the mandatory application of special investigative techniques applied to perpetrators of crimes of corruption and organized crime should be prescribed, as they are often associated with them. In addition, all international documents recommend the establishment and effective protection of whistleblowers as one of the measures to prevent corruption related to criminal acts to the detriment of the environment, as well as the existence of adequate cooperation of competent institutions not only at the national but also at the international level.

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PREVALENCE AND CHARACTERISTICS OF DOMESTIC VIOLENCE: INSIGHTS FROM NATIONAL STUDY IN SERBIA

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ABSTRACT

Purpose: This study aims to determine the prevalence and characteristics of domestic violence at the national level in Serbia.

Design/Methods/Approach: We conducted a cross-sectional study on the Serbian population using retrospective data from January 2018 to December 2024. We included all events of domestic violence reported to the Ministry of Interior, Direction of Police in Serbia during the study investigation period. We examined the prevalence of domestic violence, the characteristics of the violence by its type, and the characteristics of victims (children and adults) and perpetrators, as well as lethal outcomes. All of the data was examined by each year and altogether, using descriptive statistics in SPSS software. The study received approval from the Ethics Committee.

Findings: During the study examination period, there were 199,200 events of domestic violence reported to the police in Serbia. The highest prevalence belonged to psychological violence with 66.56% of all domestic violence events, followed by physical, economic, and sexual violence. There were 228,683 victims during the examination period, out of which 29.82% were males and 70.18% were females. Out of all victims, 8.55% were children. There were two minor perpetrators among 208,850 of them. Out of all perpetrators, 80.83% were men, and 19.7% were women. During the study period, there were 316 lethal outcomes, being 0.16% of all reported domestic violence events.

Originality/Value: Domestic violence is a global problem and public health issue, affecting mainly women. Its prevalence varies from region to region. This is the first study of this type examining data on a national level after the implementation of the Law on Combatting Domestic Violence. The results of this study demonstrate the need for continuous monitoring, better preventive measures, and targeted policies that will contribute to reducing both the frequency and the most serious (qualified) forms of domestic violence in Serbia.

Keywords: domestic violence, violence against women, police, prevalence, Serbia.

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INTRODUCTION

The World Health Organization (WHO) defines violence as “an intentional use of physical force or power, threatened or actual, against oneself, another person, against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation” (WHO, 2005). Moreover, domestic violence (DV) has been reported as the most pervasive forms of violence. Worldwide, 40–70% of female murder is committed by their intimate partner. Domestic violence happens all over the globe, ranging from 15% in Japan to 71% in rural Ethiopia, according to WHO (Semahegn et al., 2015). Studies reported that about 2 million women experience injuries from intimate partner violence each year. Women of all ages are at risk of domestic violence. One in 4 women and nearly 1 in 10 men have experienced intimate partner violence (IPV) during their lifetimes. Also, around 41% of female IPV survivors and 14% of male IPV survivors experience physical injury related to IPV (Singh et al., 2022).

DV has various forms: physical abuse (punching, kicking, biting, choking, burning, shaking, and beating, and it can be severe enough to cause permanent damage or death), sexual abuse (as unwanted sexual activity, with perpetrators using force, bribes, or coercion and making threats), and emotional abuse (most often consisting of extreme verbal abuse that hurts someone emotionally, such as unreasonable expectations, questioning the spouse's decisions and perceptions, mentally pressing the partner to do something wrong, and mentally abusing them) (Bagheri et al., 2023).

Domestic violence is a public health issue that affects families, communities, and populations. DV is also costly to the health of society, leading to adverse physical and mental health outcomes, such as higher risk of chronic disease, substance misuse, depression, post-traumatic stress disorder, sexually transmitted infections including HIV, miscarriages, and risky sexual health behavior (Kourti et al., 2021).

Domestic violence is a common and significant problem that is often underreported and not well recognized (Al Kendi et al., 2021). The most common domestic violence type is violence against women. Women are usually the victims of DV that derives from unequal power relationships between men



and women. Domestic violence affects the health and wellbeing of millions of individuals and families and is often not adequately addressed by health systems. It is banned in many parts of the world but also well hidden behind cultural customs, social norms, and religious beliefs (Alizadeh et al., 2021). Domestic violence is also widely recognized as serious human rights abuse. Women's successful campaigning raised the profile of the issue of violence against women (US conferences; Vienna, 1993; Cairo, 1994; and Beijing, 1995), which led to recognition of women's rights as an indisputable part of universal human rights (UNICEF, 2000).

In 2016 Serbia adopted the Law on Combatting Domestic Violence that focuses on violence prevention and victim protection. The Law entered into force in 2017. Domestic violence, in the sense of this law, is defined as "an act of physical, sexual, psychological, or economic violence by the perpetrator towards a person with whom the perpetrator is in a current or previous marital or extramarital or partnership relationship or towards a person with whom he is a blood relative in the direct line and in the collateral line up to the second degree or with whom he is related by in-laws up to the second degree or who is an adoptive parent, adoptee, foster child, or foster parent or towards another person with whom he lives or has lived in a common household" (Law on Combatting Domestic Violence, Official Gazette RS, 2016).

PURPOSE

This study aims to determine the prevalence and characteristics of domestic violence at the national level in Serbia.

METHODS

We conducted a cross-sectional study on the Serbian population using retrospective data from January 2018 to December 2024. The subject of the research is the state of domestic violence in Serbia. The research aimed to observe the prevalence and characteristics of domestic violence during the period of six years after the implementation of the Law on Combatting Domestic Violence.

The applied methodological procedure includes quantitative analysis of statistical data for insight into the trends and structure of domestic violence reported to the Police Directorate, Ministry of Interior in the period 2018–2024. We included all events of domestic violence reported to the Ministry of Interior, Direction of Police in Serbia during the study investigation period.

This study investigated reported incidents of domestic violence and not criminal complaints for committed crimes of domestic violence. Given that all registered incidents of violence for formal and other reasons do not result in criminal charges being filed (even though they represent domestic violence), reported incidents of violence to a greater extent reflect realistically existing violence than is the case with criminal violence applications.

In order to collect data, an inquiry was sent to the Ministry of Interior, requesting the data that related to the number of reported incidents of domestic violence during the study period. We examined the prevalence of domestic violence for each study year and during all six years of the study period. We also investigated characteristics of the violence by its type, characteristics of victims by age and sex, and characteristics of perpetrators by age and sex. We also investigated lethal outcomes of a reported incident of domestic violence. All of the data was examined by each year and altogether.



The data were obtained using the Unique Information platform system of the Ministry of Interior. The obtained data were analyzed using quantitative methodology. For analysis, quantitative descriptive statistics were applied to the data, using SPSS software. The study received approval from the Ethics Committee and approval from the Ministry of Interior of the Republic of Serbia.

FINDINGS

During the study examination period, there were 199,200 events of domestic violence reported to the police in Serbia. Examined study data showed that the highest prevalence belonged to psychological violence with 66.56% of all domestic violence events, followed by physical (around 38%), economic (around 4%), and sexual (less than 1%) violence.

There were 228,683 victims during the examination period, out of which 29.82% were males and 70.18% were females. Out of all victims, 8.55% were children. There were two minor perpetrators among 208,850 of them. Out of all perpetrators, 80.83% were men, and 19.7% were women. During the study period, there were 316 lethal outcomes, being 0.16% of all reported domestic violence events.

Table 1: Total number of domestic violence events by each year and by type of violence.

Year		Total number of domestic violence events	Type of domestic violence			
			physical	economical	psychical	sexual
*One event can contain several types of violence	2018	27,760	11,789	1,125	19,066	218
	2019	29,654	12,330	1,220	20,404	275
	2020	28,126	11,676	1,020	19,483	186
	2021	28,061	11,364	1,043	18,704	231
	2022	28,912	11,148	1,018	18,763	234
	2023	29,222	11,117	1,030	18,765	205
	2024	27,465	10,318	901	17,399	201

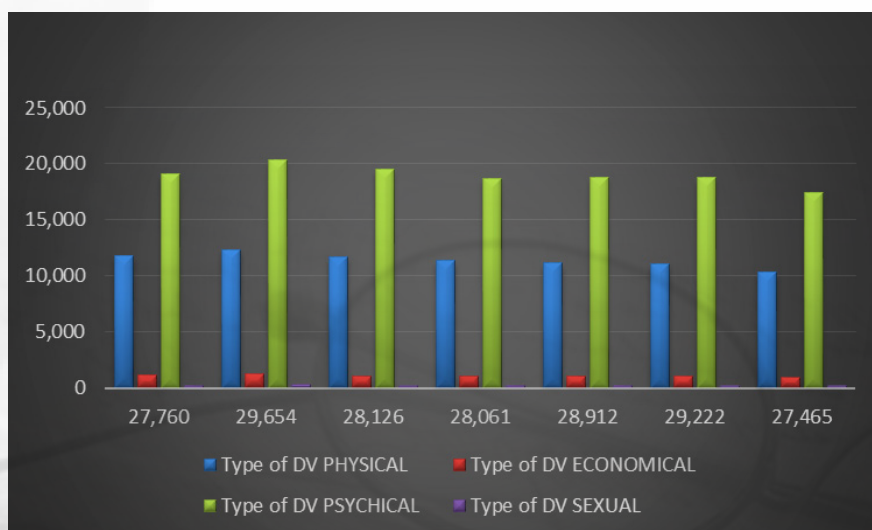


Figure 1: Distribution of domestic violence events by each year and by type of violence.

Table 1 shows the total number of domestic violence events by each year and by type of violence, while Figure 1 presents a graph distribution of domestic violence events by each year and by type of violence. The highest number of reported DV events was in 2019, and it was 29,654, while the smallest number was in 2024, being 27,465.

Figure 2 depicts the trend of growth and decline of reported domestic violence events during the study period. Our graphs show a significant decline of reported DV evidence during 2020 and 2021. It is important to keep in mind that during 2020-2022 there was the COVID-19 pandemic. The prolonged periods of confinement and enforced proximity during the COVID-19 lockdowns likely contributed to an increase in DV all over the world. However, underreporting of DV was observed.

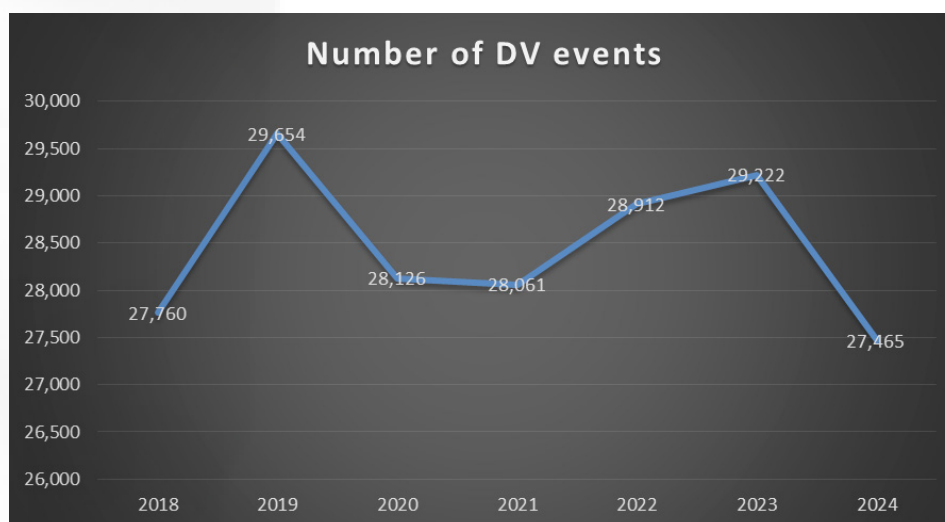


Figure 2: Trends of growth and decline of reported DV events.

Our study findings also show the distribution of victims by their sex, showing a significant difference in the number and percentage of female and male victims. The percentage of women who were victims of domestic violence ranged from 69% to 72% of women during the study period.

We presented the findings in Figure 3 and Figure 4.



Figure 3: Numerical characteristics of domestic violence victims by their sex.

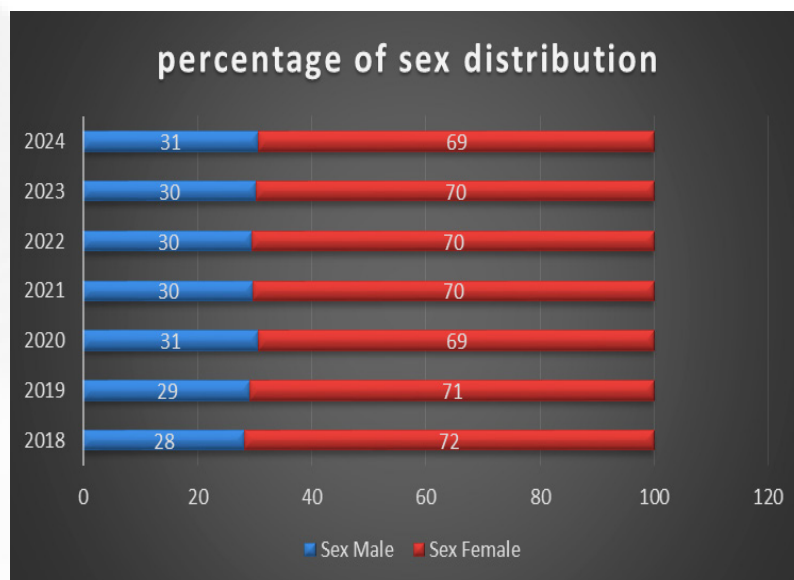


Figure 4: *Percentage of sex distribution among domestic violence victims.*

Study results also presented characteristics of DV victims by their age. There was a significant difference between minor and adult victims, presented in numerical values in Figure 5.



Figure 5: *Characteristics of DV victims by their age.*

We also investigated characteristics of DV victims by their age groups, dividing them into several groups: up to 14 years of age, 15-17, 18-20, 21-30, 31-40, 51-60, 61-70, and over 71 years. The most frequent were victims who were aged 31 to 40 years, which is clearly visible in Figure 6.

We also explored characteristics of the perpetrators, showing their distribution by sex (Figures 7 and 8). There was a significant number of male perpetrators, which varied from 23,661 men in 2018 to 23,173 men in 2024. There were 82% male perpetrators during 2018, 2019, 2020, and 81% of them in 2021, 80% of male perpetrators in 2022 and 2023, and 79% of them in 2024 (presented in Figure 8).

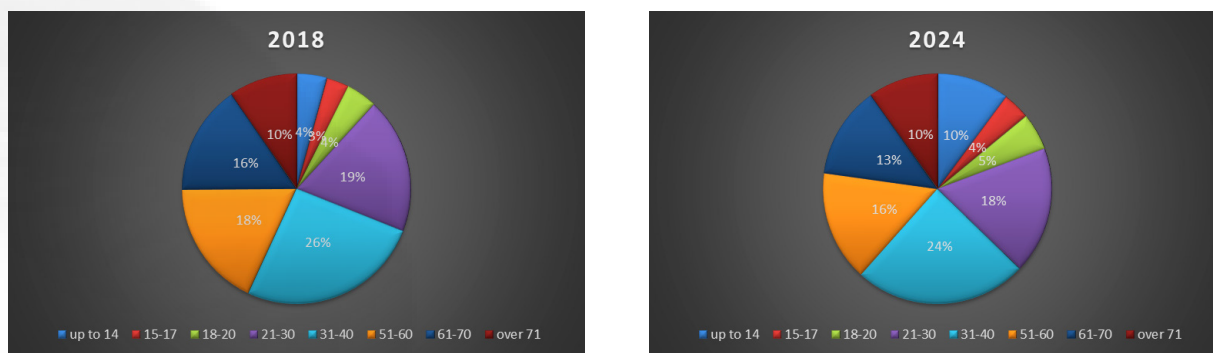


Figure 6: Characteristics of DV victims by age groups during 2018 and 2024.

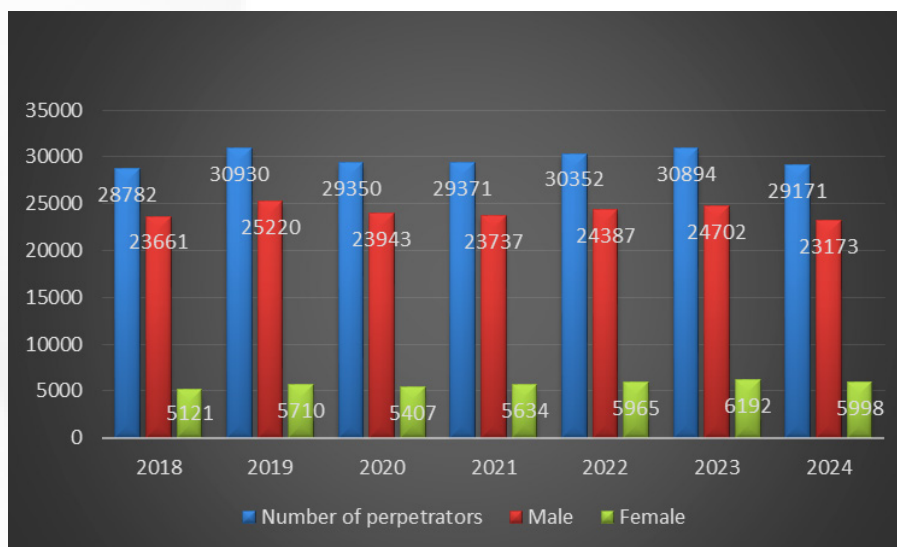


Figure 7: Characteristics of perpetrators by sex, using numerical values.

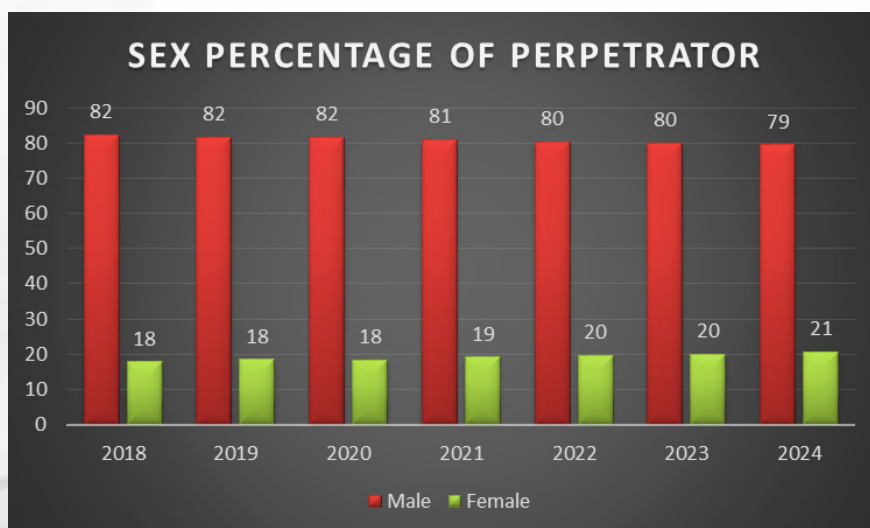


Figure 8: Characteristics of perpetrators by sex, using percentage distribution.

We also examined lethal outcomes of reported domestic violence events during the study period from 2018 to 2024. The number of lethal events is presented in Figure 9. The figure shows a decline of lethal events from 2018 to 2024, from 46 lethal events in 2018 to 33 lethal events in 2024. There is also a decline in the number of murdered victims during the study period, presented in Figure 10. There were 47 victims with lethal outcomes in 2018 and 37 murdered victims in 2024, showing a decline of 21%.

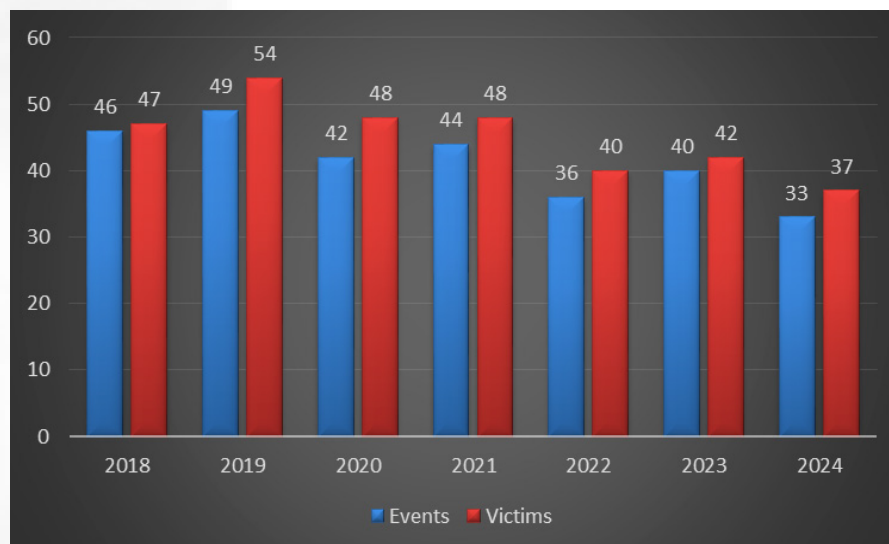


Figure 9: Domestic violence events with lethal outcome.



Figure 10. Trend of a decline in the number of victims with lethal outcome during the study period.

Also, when looking at the distribution of murdered victims by sex, there is a significant difference between murdered women and men, presented in Figure 11. There were 34 killed women and 13 killed men in 2018, while there were 21 killed women in 2024 and 16 killed men in this year. The gap between male and female murdered victims also shortens over the investigated years. When looking at the full study period, during these six years, 62% of murdered victims were women, while 38% of them were men (Figure 12).

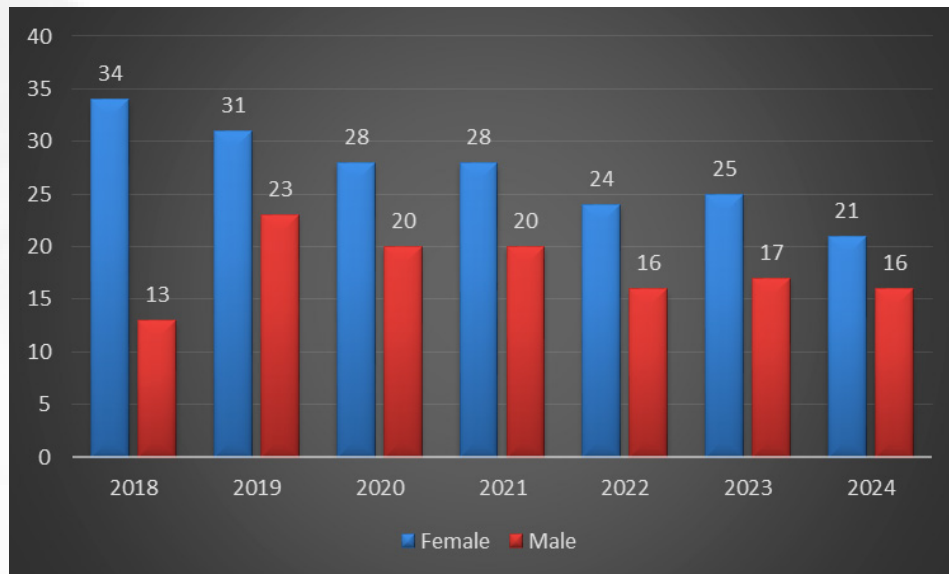


Figure 11: *Characteristics of victims with lethal outcome by their sex.*

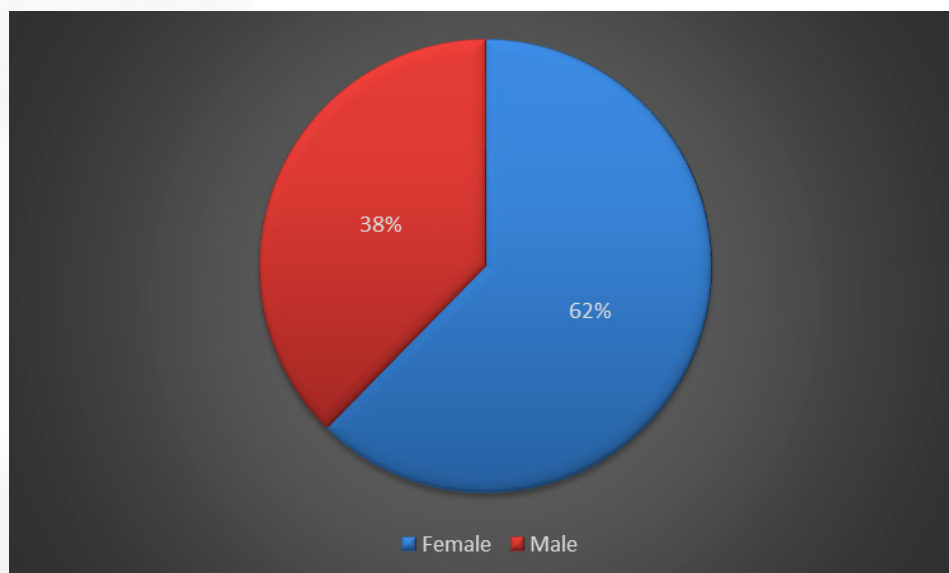


Figure 12: *Distribution of victims with lethal outcomes during the full study period.*

DISCUSSION

The findings of this national study open several important lines of discussion, including the high prevalence of psychological violence, the pronounced gender asymmetry among victims and perpetrators, the apparent decline in reported cases during the COVID-19 pandemic, the trends in lethal outcomes, and the broader implications for public policies and preventive measures.

However, results showed that particular attention should be devoted to children, not only as direct victims of domestic violence but also as secondary victims who are exposed to violence within the family environment. Although children accounted for 8.55% of all registered victims in the present study, this proportion should not be interpreted as indicating a limited impact of domestic violence

on the child population. On the contrary, international research consistently shows that children who witness violence between parents or other household members suffer serious and long-lasting psychological, emotional, and developmental consequences, even when they are not directly subjected to physical abuse. Exposure to domestic violence in childhood is associated with a higher risk of anxiety, depression, post-traumatic stress disorder, behavioral problems, impaired school performance, and an increased likelihood of either victimization or perpetration of violence in adulthood. In this sense, children represent a particularly vulnerable group and should be viewed as secondary victims whose protection requires a specific and multidisciplinary approach involving the health, social welfare, educational and judicial systems.

Furthermore, the relatively small number of recorded child victims may also reflect underreporting, as violence against children often remains hidden within the private sphere of the family and is less likely to be disclosed to the authorities. Therefore, the results of this study underline the necessity of strengthening early detection mechanisms, mandatory reporting by professionals, and child-centered support services, as well as of developing targeted preventive programs aimed at breaking the inter-generational cycle of violence.

Also, our study is the first national study of this type, which examined the prevalence and characteristics of domestic violence events reported to the police in Serbia from 2018 to 2024. This time frame is crucial since it follows the implementation of the Law on Combatting Domestic Violence, which happened in 2017. During the investigation time period, results showed a decline in the number of murdered victims by 21%, going from 47 victims in 2018 to 37 murdered victims in 2024. There is also a decline in the number of murdered women among DV victims, going from 34 killed women in 2018 to 21 killed women in 2024 and showing a decrease of 36%. The number of murdered men showed an increase of 19%, going from 13 killed men in 2018 to 16 killed men in 2024. Serbia has around 6.62 million citizens, according to the latest reports. In that sense, the number of murdered victims in 2024 in Serbia was 0.00056% of the general population in Serbia.

The data from France shows that the number of victims of homicides related to domestic violence amounted to 119 in 2023 (Statista Research Department, 2025). Statista indicated a population of 68.25 million for 2023 in France (Statista Research Department, 2023). Moreover, the number of murdered victims of domestic violence comprised 0.00017 of the total population in France. When comparing data from Serbia and France on a yearly level, there is a higher number of victims of homicides related to domestic violence in Serbia. This suggests a need for continuous monitoring, better preventive measures, and targeted policies that will contribute to reducing both the frequency and the most serious forms and outcomes of domestic violence in Serbia.

In France, around 80 percent of domestic violence events were committed against women, as reports from 2023 show. In addition, it appears that the women most affected that year were those aged between 40 and 49 years old (Statista Research Department, 2025). In Serbia, the most frequent victims were aged 31 to 40 years. Also, women comprised 62% of homicide DV victims during our study period. If we compare this data, there is a significant difference in the number of sex distributions among murdered victims in Serbia and France, showing a significantly lower percentage of women as homicide DV victims in Serbia.

In 2022, an estimated 1,174 femicides were reported in Russia, making it the European country with the highest number of such crimes. Femicides, defined as the gender-based killing of women and girls, represent the most extreme form of violence against women. That same year, Turkey ranked second with 327 cases (Statista, 2022). Femicides in Russia and Turkey, compared to the numbers of the general population of 146.98 million and 85.33 million citizens, respectively, show rates of 0.00079% and 0.00038%.



Although Europe has made significant strides in advancing gender equality over the past century, gender-based violence remains a pervasive source of inequality across the continent. This type of violence underscores the disparities faced by women, particularly in terms of their safety and their psychological and physical integrity. Future strategies for combating domestic violence should be focused on a more comprehensive, digital-forward, legally unified, and multi-sectoral approach.

ORIGINALITY/VALUE

In conclusion, domestic violence is a global problem and public health issue, affecting mainly women. Its prevalence varies from region to region. This is the first study of this type examining domestic violence data on a national level in Serbia after the Law on Combatting Domestic Violence was enforced. The results of this study demonstrate the need for continuous monitoring, better preventive measures, and targeted policies that will contribute to reducing both the frequency and the most serious (qualified) forms of domestic violence in Serbia. Results also showed that particular attention should be devoted to children, not only as direct victims of domestic violence but also as secondary victims who are exposed to violence within the family environment.

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II

ETIOLOGY, PHENOMENOLOGY AND TRENDS OF CONTEMPORARY CRIME



TRENDS OF CONTEMPORARY CRIME: ETHNOCRIMINOLOGICAL APPROACH AND INTERPRETATION OF GENDER DIFFERENCES, SOCIAL CLASS AND MIGRATION

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ABSTRACT

Purpose: The aim of this paper is to point out the importance of the ethnocriminological interpretation of crime in relation to these characteristics. In the division of criminology into phenomenology and etiology, general and clinical, ethnocriminology is a part of general criminology because the scope of its study includes the characteristics of ethnicity, that is, the characteristics of certain marginalized social groups, by race, gender, certain religious characteristics and the influence of these characteristics on the occurrence of crime, as well as the ways of social reaction to these phenomena according to the ethnic characteristics of the perpetrator or victim.

Design/Methods/Approach: The main methods that will be used in the paper are description, historical method and analytical method in the theoretical observation of phenomena, in a cause-and-effect sense, related to the ethnocriminological concept, as well as in the analysis of individual cases of media reporting in which elements of the ethnocriminological or ethnovictimological approach can be observed.

Findings: As early as the 19th century, the term criminal saturation was used in anthropological theory, and in the synthetic concept of modern criminology, it is possible to single out a series of phenomena that are described and directly related to race and ethnicity and crime, which also includes explanations related to interactionism and labeling, as well as parts of critical criminology in relation to the crime of marginalized social groups.

Originality/Value: The ethnocriminological approach, in a cognitive and methodological sense, indicates that when it comes to issues of ethnicity in criminology, it is noted that in older sources this concept is most often linked to a critical attitude towards discrimination expressed in relation to certain ethnic groups and their characteristics and in terms of criminal etiology, i.e. a direct causal connection with certain types of crime. It is noticeable that attention is drawn in detail to the position of minority groups, critically reviewing various forms of discrimination committed against them. It links "ethno features" to ethnic minorities, and before that it writes about segregation, as well as minority groups in relation to race, ethnicity, religion. Criticism of ethnocentrism is a mandatory way of noticing certain ethnological characteristics of the population, potential perpetrators or victims of crime in order to prevent and combat crime. Rigidity of attitudes is ethnocentrism, and the concentric circles of knowledge about customs, with their rules, with their trappings do not represent their abolition, but rather an understanding and introduction of modern forms of combating crime while respecting diversity.

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Movements of migrants in the first quarter of the 21st century represent an additional reason for drawing attention to ethno-criminology. In the literature, it is possible to find a connection between ethnocriminology and the criminology of colonialism. In particular, the questions of epistemology and research methodology were critically observed because this would achieve a critique of the social and historical denial of colonialism and racism.

Keywords: ethnocriminology; method; victimology; gender; class; racism.

About the author

Miomira Kostić, PhD, in the position of full professor in the Criminal Law scientific area she was elected in 2011, on subjects of Criminology, Penology, Victimology, Legal gender studies and Clinical legal education in the study programs of undergraduate studies of law; Juvenile criminal law, Organized crime, Violent crime and Law enforcement of criminal sanctions in the master study program studies law; and Criminology, Criminology and Penology and Juvenile Delinquency in the study programs of doctoral studies in law. Vice dean for material and financial operations of the Faculty of Law in Nis performed in the period 2013-2016; Director of the Center for Legal and Social Studies and Head of the Department of Criminal Law Science, performed in the period 2016-2019.

INTRODUCTION

In the hitherto unsolved dilemma about the question what will prevail in humans - destruction or creation, a large number of gloomy topics arise that have not answered the question, which would be based at least on a firm belief in one or the other ultimate solution. There is almost no question of social life, with the hope of completion, as there is an ideological grounding in an individual or a group, around what is right and what is wrong. The wide encompassing expanse of human actions without interruption expands the scientific field of criminology in whose research, which is based on the observation of illegal behavior, it is not always possible to give answers, but it is always possible to ask questions - why something happened (Kostić, Simović & Obradović, 2019). In writings on scientifically based research, it is not a common practice to be able to read clearly and boldly expressed views, which are sometimes described as: "Science and blissful ignorance" (Radovanović, 2021). In different essayistic approaches to some topics, contemporary intellectuals in Serbia, such as S. Crnobrnja, attract attention with their works on various current topics. Thus, writing about ethnocide, Crnobrnja raises the issue of the destruction of the culture of racial minorities, and emphasizes that "ethnocide represents the systematic destruction of a way of life and opinions different from those of the one who carries out that destruction" (Crnobrnja, 2024: 56). In this context, it is necessary to re-examine the issues of the ethno-criminological and ethno-victimological approach to crime and the victim, only as a part of the interactionist approach to the study of delinquency, and to re-state the criticism of the ethnocentric observation of social phenomena.

Therefore, being carried away by the daily events of the turbulent world should influence some knowledge from the field of well-defined science, criminology, to return to the original thinking. Thoughts on criminality, from the oldest sources until today, have not been just in legal terms, more exactly, not only in the criminal law point of view. In public discourse, crime and criminals are represented heterogeneously, indefinitely, sensationalistically and inaccurately. Experts of various other sciences, psychologists, biologists, doctors, anthropologists, sociologists, who used the knowledge of their sciences and scientific disciplines as a source for the interpretation of various facts that stood out by



observing the criminal phenomenon, or the criminal himself (Kostić, 2011: 265), first began to deal with criminological issues.

Criminological literature, whether textbook or monographic, contains an immense number of articles that primarily depend on the target group for which they are intended - students and their mentors in research work, or as specially researched topics that at some point in time occupied the attention of criminologists in their observation of the studied phenomenon, and then were forgotten. Because there is a lot of new normality to write about, and in fact, classical knowledge forms the basis of everything.

Questions related to ethno-criminology, that is, the ethno-criminological concept of the criminal phenomenon and its causality, represent the basic theme of this work, with reference to the criticism of ethnocentrism. In the methodological sense, a description of the theoretical observation of certain phenomena will be applied, in a cause-and-effect sense, related to the ethnocriminological concept, along with the method of analysis of individual cases of media reporting in which elements of the ethnocriminological or ethnovictimological approach to gender differences, belonging to social class and migration of the population can be observed. As pilot research on this subject matter, this paper aims to set the initial structural framework for future research on this phenomenon by providing a comprehensive coverage and analysis of the available research sample. The research was structurally organized in two parts: 1) theoretical research, and 2) qualitative research and analysis of the content of selected texts.

The author first presents the theoretical framework of the research, including the results of some previous research on this subject matter, and clearly defines the research sample and the motive for the research. A special motivation arose from the author's intention to draw attention to the methodological procedure of studying delinquent behavior, or unacceptable behavior in the positivist sense, which is clearly described in the Anglo-Saxon literature on criminology, and is called ethnomethodology. In the domestic literature, the observation is more limited to distinguishing the distribution of crime according to the principle of ethnicity, such as the village and the city or the ecology of crime in urban areas. With the ethnocriminological approach, attention is paid to race, sex, gender and migration movements of the population. Public attention, with media portrayal of marginalized social groups (Димовски, Костић & Милић, 2016), or, in the last twenty years, with the insistence that the public's attention be drawn to domestic violence, but less often with reference to the application of the clinical method in observing this phenomenon (Dimovski & Kostić, 2016). Thus, the influence of the ethnocriminological approach on crime and to the process of victimogenesis, then the success or failure of social control can be observed through three correlated systems: 1) theoretical content; 2) consequences of media coverage about ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO); and 3) small public interest about the subject.

ETHNO-CRIMINOLOGY APPROACH IN CRIMINOLOGY

Numerous questions related to the basic premises of criminology as an independent science, such as subjects, methods, ideological starting points of criminologists when interpreting the empirical results of research, at first glance represent standard topics that belong to the starting points of criminological literature. Dealing with criminology, like any other social science or scientific discipline, implies a clear, precise determination of the subject and goal of theoretical and empirical research, as well as the application of adequate methodological procedures, in order to gain knowledge of the subject being studied. Various questions, from the fields of: sociology, criminology, penology, victimology, as well as the answers to them, are covered by some of the leading ideas of the intellectual tradition in the West, or in the East, primarily about the nature of scientific knowledge and the ways to reach it. Similarly, the thought that "for criminology there is no absolute knowledge - theoretical or empirical,



they constantly overlap, go from one level to another, so that criminology is a theoretical-empirical science” (Avanesov, 1981: 39-43).

Criminology deserves its status as an independent, theoretical-empirical, social and interdisciplinary science with its independent subject and methods applied in research, regardless of whether it is viewed in its pluralistic or synthetic basis. However, just as several scientific, related disciplines deal with the same object of research, a certain phenomenon in the external world, so also several of them use the same methods in the study of that phenomenon. Therefore, in science, the question arises of a clear demarcation of two separate, independent sciences, which have the same subject and research method. As emphasized by Ž. Horvatić (1981), viewed from orthodox positions, it could be demanded that only “a special subject and specific methods are conditions for the formation of a special scientific discipline” (Horvatić, 1981: 22). Illustratively, the words of Packer should be singled out: “Concepts are allowed to collide and mix. Boundaries are erased between documentary and fiction, ecology and economy, individual and community, food and living beings, oysters and people, past, present and future... like recursive waves that return to brief encounters with subjects, and each re-examination reveals new possibilities” (Lakić, 2024).

Often, perhaps most often, the carefully avoided questions of the relationship of one discipline with another, that is, the relationship of criminology with related sciences and scientific disciplines, in fact, return to the foreground the beginning of the separation of criminological thought, as separate, independent, that is, its first definition as Garofalo did. In his book *Criminology*, Garofalo writes in the preface to the English edition of the book in 1913: “From the earliest days of my legal studies, the question began to arise in my mind: how does a lawmaker arrive at an accurate knowledge of the type and amount of punishment that is suitable to be imposed for various forms of crime. With what meaning does the lawmaker/judge impose a sentence of five years’ imprisonment in a penitentiary in one case for theft, and in another case, for example, is a three-year sentence in a medium-security facility sufficient?” (Garofalo, 1968: XIX).

In his definition of natural crime, Garofalo does not mention ethnology, nor ethnicity, unless people on the entire surface of the planet Earth are viewed ethnocentrically in relation to the rest of the living world. He does not link the concept of natural crime to ethnicity, but to the entire human race as a whole, so “the word natural is given in the meaning of what is not conventional, but in the sense of what exists in human society independently of the circumstances and needs of a given era or the special attitudes of legislators” (Garofalo, 1968: 4). Garofalo actually refers to the understanding of what is considered a crime in all developmental periods of human society and in all parts of the world. He cites murder as an example (Garofalo, 1968: 5). It seems that these thoughts, independently of ethno-criminology, can be determined in a similar way in the literature of a recent date that deals with the concept of modern law. If the work of the criminal court is observed, for example in the present, as well as in the past, the following questions can be distinguished: the position of the court in relation to known facts, the role of the court, the role of the court in obtaining information in relation to the facts and the question of what facts this information contains, in relation to the type of facts for a specific case (Žbikovska, 2019: 151), but again in the context of the prevailing understanding of an illegal phenomenon (the views of professionals in the field of criminal justice on domestic violence twenty years ago and five years and today).

Lombroso, whose students were Garofalo and Ferri, in his study on the causes and treatment of crime, writes about emigration and immigration as the causes of crime, subsuming these phenomena under the concept of population density (Lombroso, 1968: 63-64). He uses Ferri’s term “criminal saturation” when he mentions immigrants and foreigners in Italy and their participation in increasing the volume



of blood offenses that, according to their cultural patterns, are carried out out of duty or even from their belief in having the right to kill (Lombroso, 1968: 63-64).

In the synthetic concept of criminology, it is possible to single out a number of phenomena that are described and directly related to race and ethnicity. It is interesting how modern criminological literature clearly emphasizes this. For example, Reid (Reid, 2003:116) through the general index of terms with the words race and ethnicity, lists as many as thirty-eight related terms. Some of them are expected, such as: child abuse and police brutality, while others draw more attention to the reader because at first glance they are not connected to the ethnic element, such as: selection of jurors, fear of crime, disparity in the criminal justice system, etc.

In the further search in the Anglo-Saxon criminological literature on issues of ethnicity in criminology, it is noted that in older sources this term is most often associated with a critical attitude towards discrimination expressed in relation to certain ethnic groups and their characteristics and in terms of criminal etiology, that is, a direct causal connection with certain types of crime. Clinard (Clinard, 1963: 635) draws attention in detail to the position of minority groups, critically referring to various forms of discrimination against them. He relates ethnic characteristics to ethnic minorities, and before that he writes about segregation, as well as minority groups in relation to race, ethnicity, and religion. At the same time, it describes individual cases of their discriminatory position in society and explains the origin of most immigrants in the USA, starting from the end of the 19th century. Similarly, but related to the conditions in penal correctional institutions, it is also found in the book by Scott and Flynn (Scott, Flynn, 2014: 142), written in the first fifth of the 21st century, where they write: "Incarceration, surveillance and immigration policies must be understood within the context of racism at the state level", while emphasizing that the roots of racism in the United Kingdom are deeply rooted in the history of the Prison Service, in which in the 1970s 20th century was dominated by members of racist organizations, such as the National Front (Scott, Flynn, 2014: 142). In the sociology of American prisons, the words of Wacquant are striking, who writes: "the predatory culture of the street... entered and reshaped the social structure and culture of prisons and correctional institutions, which, in the reverse direction, transformed the urban areas of the "Black Belt" to which the majority of ex-African-American convicts return after leaving the institutions (Wacquant, 2001: 110).

Here we should also mention the works that in their subtext specifically consider the issues of ethno-criminology in the context of colonialism and the ethno-racist approach to delinquency, as well as penological issues. The author Kitossa even uses the term colonialist criminology, and draws attention first of all to a series of issues related to the ethno-racist approach to delinquency in Canada, calling on universities to introduce issues of ethno-criminology and criticism of ethnocentrism into criminological topics. She even states that criminology in Canada has a *white face* (Kitossa, 2012: 219).

In domestic literature, it is interesting to draw attention to articles about media reporting on violence against women, with the connotation of articles in print and electronic media on the topics of discrimination based on personal characteristics, such as: gender, race, disability, poverty, old age, belonging to sexual minorities (Mršević, 2019). Although the texts on violence against women do not distinguish the notion of an ethnographic approach to this study, it is enough to notice other terms that may point to it: brutalization of the audience, social invisibility, marginalized social groups, penological populism, gender discrimination, gender stereotypes, gender identities. The concept of an impervious system stands out, which the author brings into the context of belonging to a certain social group with such strong patriarchal notions that it turns a female victim into a killer of a torturer, and then into a suicide. That patriarchal ideology of a narrow social group, an ethno-group, imposes an impervious system of behavior "which is so resistant to change that it leads rather to the loss of one's own life than



to questioning the further applicability and justification of that anachronistic ideology in modern reality” (Mršević, 2019: 125).

THE METHOD THAT DETERMINES THE DIRECTION

Criminology, understood in a synthetic or pluralist sense (Konstantinović Vilić, Nikolić Ristanović & Kostić, 2012: 25), is a scientific study of crime/criminality, especially in the part that relates to the causes that influence the occurrence of criminal behavior. Authors such as Schram and Tibbets (Schram & Tibbets, 2021: 3) use the word “scientific” which distinguishes their definition of criminology from definitions based on different perspectives and research on crime. The philosophical and legalistic observation of criminality is based on logical and deductive reasoning, the development of what makes logical sense, as the authors explain. It is interesting that they also highlight the work of journalists, who, according to them, have a key role in investigating crimes by investigating events in criminal justice and exposing injustice, as well as new forms of crime (green crime, ex. author). However, the philosophical, legalistic or normative perspective of crime, according to Schram and Tibbets, does not provide justification for the scientific understanding of criminology, because they do not use appropriate scientific methods in their observation of crime (Schram & Tibbets, 2021: 3).

The dilemma, formulated by the question, what is more significant in terms of obtaining scientific results, the application of qualitative or quantitative research into the criminal phenomenon, almost overcomes the need for clarification and presentation of a valid argumentation, precisely because it depends not on such a dilemma, but on what is set as the subject of criminological research, and at what level (macro or micro) the criminal phenomenon is observed. The path to knowledge is important, both for criminology, as an independent science, and for the practice of criminal justice. The value, suitability and necessity of using a qualitative method are open to debate. Because of their own unique contributions - the depth of understanding of the phenomenon, as the primary goal - that can be provided by applying qualitative methods, there is a debate among criminologists about how often these methods can be used, and if research is conducted according to those rules, how and in what way it can contribute to the creation of criminological knowledge and the practice of criminal justice. Due to the diversity in data acquisition, the way data is collected and analyzed, and how the data and data analysis shed light on the research subject, the findings obtained through qualitative research are “much more informative, richer and offer increased understanding, compared to those obtained through quantitative research” (Tewksbury, 2009: 38). In the criminological literature, it is emphasized that qualitative research is directed towards the essence of a criminological phenomenon, its peculiarities, determining the characteristics of: events, people, interactions, cultural settings and experiences. Also, Berg, as one of the leading proponents of qualitative research in criminology, explains: “Quality refers to what phenomenon, where, when and how it happened - to its essence and its environment. Therefore, qualitative research refers to meaning, concepts, definitions, characteristics, metaphors, symbols and descriptions of things” (Berg, 2007: 3). Qualitative research achieves a true understanding of the social aspect of how crime occurs and how the state structure and processes, related to it, react to the committed crime, in a culturally based context. However, the results of criminological research, in which qualitative methods were applied, are very rarely published. According to data from 2005, for example, less than 11% of scientific articles in criminology, published in high-ranking journals in the field of criminology and criminal law, contain research results obtained by applying qualitative methods, while less than 15% were published in lower-ranking journals (Tewksbury, 2009: 40).



In the qualitative research of criminological/sociological phenomena, the field of ethnography occupies an important place. Ethnography is the process of describing the culture or way of life of a people. The meaning is that each person is a reflection of his culture and that all gestures, symbols, songs, statements of one person, as a member of that culture, have an implicit meaning for all other people who belong to that nation. Ethnographic approach involves observing and keeping notes, for example, about the observed phenomenon, or a group of people, or the displayed customs and rituals. In doing so, the researcher should follow some instructions, such as: write everything down immediately and do not discuss anything before writing it down; the rules and sequence of events should be followed carefully, as well as how long each sequence lasts; the perceived should be separated from one's own feelings or thoughts. Ethnography was developed by anthropologists, the most famous being Bronisław Malinowski (Bronisław Kasper Malinowski, 1884-1942) at the beginning of the 20th century. He presented his model of participatory observation in the book *Argonauts of the Western Pacific* in 1922 (Karanović, 1979). But at the same time, members of the Chicago School also adopted the ethnographic method, as a way of observing phenomena in cities, since they were pioneers in the field of urban sociology. Since then, ethnography has been one of the basic methods of sociological research. The aim of the ethnographer is to develop a rich understanding of how and why people think, behave and communicate as they do in a given community or organization (field of study), and most importantly, to understand these things from the point of view of those studied (known as the “emic perspective” or “insider point of view”). Thus, the goal of ethnography is not only to develop an understanding of practices and interactions, but also their meaning for the population under study. Importantly, the ethnographer also works to situate what they find in a historical and local context and to identify connections between their findings and the larger social forces and structures of society (Crossman, 2019).

In modern textbook literature on criminology, the application of the ethnographic method is primarily related to participant observation as the best procedure for studying groups of people who encounter less understanding in society (Hagan & Daigle, 2020: 47), or, we can call them marginalized. The main advantage of the participant observation method is in the strategy of understanding the object of observation, where there is less opportunity to influence the naturalness of the occurrence of the phenomenon, because it is observed in its natural environment. Such an ethnographic approach provides observation of culture (Hagan & Daigle, 2020: 47). It is interesting that some criminologists call this method “first-hand observation”, or as “field observation” where social behavior is systematically observed through ethnographic and social interactions in different families (Dillon, 2020: 275). In doing so, Dillon subsumes these explanations under symbolic interactionism and ethnographic research (Dillon, 2020: 275). Similarly, Barkan emphasizes that field studies or ethnography are qualitative methods that have taken root in many, as he emphasizes, classic criminological studies (Barkan, 2012: 17). Barkan especially points out that the most famous studies in the USA in which ethnography is applied are those on four categories of residents: on urban African Americans; on women living on city streets; on Chicago gang leaders and on male homosexual sex in public toilets (Barkan, 2012: 17). To this can be added theoretical and empirical research on convict gangs in Serbia, for example (Dimitrovski & Kostić, 2018).

These explanations of the ethnocriminological observation of delinquency/victimization correspond to the author's intentions to draw attention to classical criminological qualitative research, whose principles of field studies are more than necessary today for reasons of interaction and observation of circumstances in local communities.



PUBLIC DISCOURSE ON ETHNOLOGY, VICTIMS OF CRIME, GENDER APPROACH AND MIGRATIONS IN MEDIA REPORTING

Criminal behavior and crime in general have always been the subject matter of public interest. Reading crime reports in newspapers is driven by mere curiosity, and aimed at satisfying the readers' interest in the perpetrators of criminal offenses, their modus operandi and the ultimate punishment. Such accounts may generate different feelings: sympathy with victims, pleasure, frustration, anger, indifference, helplessness, etc. However, we may assume that media reports on crime are primarily aimed at raising awareness and making people think about the social phenomenon and initiate socially justified action.

The consumption of mass media content is most frequently associated with the consumption of entertainment content. For this reason, sociological literature emphasizes their "marginal" importance in people's lives, which can also be used as a form of mass manipulation because it is evident that mass communications are part of daily social activities. As noted by Giddens, "media such as newspapers or television have a strong influence on our perceptions and the creation of public opinion in general" (Giddens, 2005: 454). On the other hand, racial and ethnic stereotypes in media coverage of crime, the criminal and the victim continue to represent important themes in modern criminological literature. (Barkan, 2012: 33).

Hence, there is a need in domestic scientific and professional public to research how media reporting affects the creation of public opinion on certain social phenomena, such as: juvenile delinquency, refugees, human trafficking, domestic violence, violence at sports events, respect for human rights, ethnology, victims of crime, gender approach and migrations etc. The research would include the collection of data on the way of reporting in electronic media about ethnology, victims of crime, gender approach and migrations, as key words of our observation (KWO); since 2006 until today. In 2025 two important laws were passed in Serbia: Law on Public Information and Media (Zakon o javnom informisanju i medijima, "Sl. glasnik RS", 92/2023, 51/2025), as well as Law on Electronic Media (Zakon o elektronskim medijima Sl. glasnik RS", 92/2023, 51/2025).

The research included the collection of data from newspaper reports published by the daily newspaper *Politika* on the experiences of and about KWO. The Serbian daily newspaper *Politika* is an irreplaceable historical source of knowledge about the history and culture of the people in the Balkans. Thus, it is impossible to conduct research on media reporting on various social phenomena without referring to newspaper articles published in *Politika* as a source of archival material.

The research takes place at the time (and a little after the time) of some significant but diametrically different events. The first one is important in terms of national culture. On 25 January 2024, the daily newspaper *Politika* marked its 120th Anniversary since the publication of the first issue of *Politika* in 1904. Relying on the history, importance and influence of the daily newspaper *Politika* (Trklja 2024), the research focuses on the newspaper articles published in online form. For the purposes of this research, we used the *Politika* online archives dating back to 2 July 2006.

This approach to research was rooted in the experience of the previous research conducted: the one, during 2007-2014, for the monograph *Juvenile delinquency in light of newspaper reports in the daily newspaper Politika 1904-1941* (Kostić, Dimovski, Mirić, 2015); the other one, during 2021-2022, as the chapter: „Mapping Women's Role in the History of Wars in the Former Yugoslavia, as Depicted in the Daily Newspaper *Politika*”, (Kostić, M., 2023, p. 1-31), in the monograph: *The handbook on female criminality in the former Yugoslav countries* (Stanojoska, Dimovski, Maksimova, edt, 2023), and the last one: *Representation of Transnational Crime Victims and Their Legal Protection in the Serbian Media: Public Awareness or Indifference* (Kostić 2025, p. 107-118).



Qualitative research and analysis of the content of selected texts

What was included in the research was the analysis and the collection of data in newspaper reports published in the daily newspaper *Politika* about ethnology, victims of crime, gender approach and migrations, as key words of our observation (KWO). The research sample included the archived numbers of the daily newspaper *Politika*, which are available via the *Politika* online portal since 2 July 2006.

The following basic objectives of the work were set:

- to gain basic knowledge about the way of reporting in the written and electronic media in Serbia about ethnology, victims of crime, gender approach and migrations, as key words of our observation (KWO), and, more precisely, from the year 2006 when the *Politika* online portal has started until nowadays. (the *Politika* online portal, July 2, 2006);
- to determine to what extent the forms of socially negative behavior exhibited by the victims influenced/influences the manner of reporting on them.

The basic hypothesis, which will be verified by the research, is: the professional public has shown little interest in the way of reporting in written and electronic media about ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO).

The method of content analysis of newspaper articles on the way of reporting in electronic media in Serbia on the experiences of ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO) since 2006, when the *Politika* online portal was established on 2 July 2006) will be applied.

The analysis of the content of selected texts included collecting data on the manner of reporting in electronic editions of the daily *Politika*, on ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO). The following basic goals of the work have been set:

- to gain basic knowledge about the manner of reporting on ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO);
- to determine which of these subjects are most often represented in the observed period;
- to determine the extent to which forms of socially negative behavior by and against victims of ethnological approach to someone, victims of crime, gender approach and migrations (KWO) influenced the way of reporting on them.

The material was first collected by keywords and years, by searching the online archive of *Politika*, and then, using the method of analyzing the content of articles, available data were collected on how journalists report on the experiences of ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO) in our region. The orientation sample was made by searching the articles using keywords: ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO). After collecting the basic research sample, the researcher analyzed and sorted out the selected newspaper articles into content areas by using the content analysis method. Then, the collected data on the experiences of the phenomena as ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO) were thematically organized into several content-specific subtopics.

The spatial and temporal boundaries of the research were determined on the basis of the availability of newspaper reports on the research subject matter via the online portal *Politika*,² as well as the objective need to collect and present material directly related to the scope of the research task set within the framework of the article.

2 Given the fact that the *Politika* online archives date back to 2nd July 2006, this date was chosen as the starting point of online research. (See: *Politika* online, <https://www.politika.rs/sr/clanci/arhiva>).



Research results and discussion: Content Analysis of selected newspaper articles

This part of the paper presents the research results, including an overview of the selected newspaper articles from the daily newspaper *Politika* on the phenomena of ethnology, victims of crime, gender approach and migrations as key words of our observation (KWO). The collected data were thematically organized into several content-specific subtopics, which will be presented here with reference to specific newspaper articles. Each narrative account will be followed by a brief discussion on the way of media reporting and interpretation of events.

There must be a beginning to every story, including the story about ethnology in mass media. It is interesting to note that only 33 hits appeared with the keyword ethnology. All those articles are of different content and with different current topics, then from 2006 until now, with topics from culture, about exhibitions, films, sociological and philosophical or daily political discussions. But the combination of keywords with the word ethnology and the words: victim/s, gender and gender and migration/e did not give any hits.

Out of 33 hits, with keyword “ethnology” in the titles, in the *Politika* Archive, the oldest one was from 26, October 2006. The term “planetary hysteria” was used to explain the phenomenon of SMS messages as a new form of folklore communication: “Telephone messages are present in all languages of the world and they all have the same content. The same patterns, topics, methods of processing, linguistic means... This planetary phenomenon is obviously related to the merging of modern technologies and the human need to it symbolizes, aestheticizes everyday communication, human relations, rules of behavior” (Masniković, 2006).

After almost two decades later, in folklore communication, in looking at the ethnological and ethnic connotation of real actions, phenomena, we find an article in *Politika* entitled: “Why did the boy kill the lambs” (Đorđević, 2024). In an article under this title, the daily newspaper *Politika* also writes the following: “The higher public prosecutor’s office in Pančevo is acting on the incident in Markovac near Vršac, where a 13-year-old boy killed 12 lambs with an ax on Monday at 5:30 p.m. The case was reported by the injured party, P. T. (52) from Markovac, when he informed the police that he found 12 killed lambs in his barn in Markovac, reported to the Higher Public Prosecutor’s office in Pančevo. The police, as added in the statement, conducted an investigation, suspected that the lambs were killed by a boy born in 2010 with an ax that was taken from him. Since, as the prosecution further states, it was about a person who had not reached the age of 14 and was not criminally responsible, the prosecution ordered the police to submit a report on the incident, to inform the Center for Social Work in Vršac about the child’s behavior so that the institution could take measures within its jurisdiction. The child was not reported to the Higher Public Prosecutor’s Office in Pančevo before the aforementioned event because of committed crimes and misdemeanors, the Higher Prosecutor’s Office added” (Đorđević, 2024).

The use of the term ‘folklore contents’ in articles about research conducted by modern, young anthropologists and their achievements (Masniković, 2006) is certainly not new. The wild anthropological thought is attributed to Lévi-Strauss the Jew, who was absorbed in fieldwork in the countries of South America and was seized by “ethnology as a rebellion against Durkheim, who was not a man of the field, a man of expeditions, while I discovered ethnology through the English and Americans”. In this article in *Politika* from 2008, the following words are also mentioned: “The Sad Tropics is a masterpiece of anthropological writing, which became an anthropological bestseller: an intellectual autobiography, a travelogue and a philosophical reflection on travel, an ethnographic study and a philosophical-reformist treatise (homage to Rousseau and themes of the “noble savage”). The second level of the text consists of scientific ethnographic research in the field, and the third level contains traces of Lévi-

Strauss' later theoretical work in the form of an elaborate distinction between "hot", "mobile", "thermodynamic" societies and "cold", "static", "mechanical" societies" (Velimirović & Gorunović, 2008).

Apart from these newspaper articles about phenomena that individually have an ethnological resonance, we single out a few more with convincing examples of criminological/victimological understanding of behavior that can be brought into direct connection with the ethnographic approach in the victimogenesis of minority groups and hatred towards them.

In 2012, seventy years have passed since the murder of the painter Sava Šumanović. On the occasion of that event, *Politika* writes: "It has been 70 years since the brutal murder of Sava Šumanović, one of the most prominent Serbian and Yugoslav painters of the 20th century. In Sremska Mitrovica, on the night between August 29 and 30, in the area next to the old Orthodox cemetery, around 150 innocent men, women and children from Šid, among them the forty-year-old painter, were martyred." The author of the article, in addition to the original documentation about Sava's arrest, also states the following: "Sava's mother did everything to free her son, offered her captivity in exchange for his freedom, wrote to many addresses, but nothing helped. Marija Demšhar, a Slovenian internee, who spent the war in their house, recorded direct testimonies about the last days and arrest of the artist, as well as the grief of Persida's mother. She brought the warmest memories of the family that accepted her in harsh times, and her diary and letters were translated into the book "Ethnology in Letters and Pictures" (Krstić-Faj, 2012).

Some thoughts expressed long ago about the usefulness of crime from the aspect of social development, as emphasized by Durkheim in his concept of distinguishing between normal and pathological social phenomena, even emphasize that crime is a normal social phenomenon, which is a factor of social health (Konstantinović Vilić, Nikolić Ristanović & Kostić, 2012: 293). The questioning of the understanding that every evil has its good is also within the ethnographic observation of social phenomena and events, especially those where the victims are singled out because of their belonging to race, gender, and religious belief. Speaking in an interview given to *Politika* in 2016, B. Jovanović, one of our most famous anthropologists, touched on the topic of committing evil, on an ethnic basis, during the Second World War, but when asked about the benefits for a society that can have evil, such as normality (criminality), Jovanović declares: "There can be some benefit from individual, small evils. But proverbs exaggerate some truths to the point of inadmissibility, because if evil cancels the very assumptions of life, then from the victim's point of view, one cannot talk about no good that such evil brings. Perhaps a negative historical experience, such as genocide, can be a preventive against repetition, but such a positive effect of evil also assumes a huge price, which obscures any thought of the possibility of being labeled as something good" (Radisavljević, 2016).

However, in *Politika*, among those 33 selected texts for the keyword ethnology, an article about the views of the French philosopher Jean Baudrillard, written about by Z. Andrić, was noticed. In his article in *Politika*, this author quotes Baudrillard's words from 2001, which, in relation to Durkheim's view on the usefulness of evil, presents an even more radical position: "Metaphor gives way to the metastasis of repeating the same thing. Disaster does not mean death and end, but rampant and uncontrolled growth; the end of the dialectical arena between force and counterforce is certain; "evil" can no longer be defeated. "Systems regulate themselves through collapses, viruses, AIDS, cancer, terrorism" (Andrić, 2007).

The image of folk religion and spirituality is included in the dictionary of the Serbian Academy of Sciences and Arts, the creation of which began in 1959 and is still ongoing (Ristić, 2016). And this text was among those containing the word ethnology. It explains that the excessive volume of the Dictionary is necessary because the wealth of culture and religion in our country is enormous. However, researchers will focus their attention on a specific research subject, so the volume of material will remain unnoticed in the selection of what is required. The author Ristić only points out an example of the

explanation of the word bliss, so she writes that “for example, the word “bliss” should be interpreted as “the feeling of greatest pleasure” and not as “feeling like in paradise” or the like. “regardless of the fact that the word most likely once referred to the idea of a state in paradise”, whereby “the church lexicon in the corpus of the Dictionary is confirmed by domestic or translated sources from other fields: fiction, philosophy, ethnological-ethnographic, dictionaries, encyclopedias, textbooks and collections of words from folk speeches” (Ristić, 2016). It would be interesting to explore what the dictionary contains in the explanations of evil that occurs in the form of illicit behavior. With the intention of “bliss” this segment of the work was completed because it points to countless questions of the application of the ethnographic method in the study of delinquency. It is necessary to use this method to study the hypothesis of a devil woman or an evil woman as to a delinquent woman who carries within her the basic discrimination of women in the retributive justice system. Given that the number of female criminals is so small compared to male criminals, it seems even more terrible (Barkan 2012: 231). Therefore, there is a dilemma. If the dictionary contains such explanations, it should be investigated.

CONCLUSION

As early as the 19th century, the term criminal saturation was used in anthropological theory, and in the synthetic concept of modern criminology, it is possible to single out a series of phenomena that are described and directly related to race and ethnicity and crime, which also includes explanations related to interactionism and labeling, as well as parts of critical criminology in relation to the crime of marginalized social groups (Kostić & Mirić, 2016).

One paradox stands out in the criminological literature. The contemporary focus on communities has emerged at a historical moment in which the decline in the relevance of communities as a source of strong connectedness among its members is empirically observed. In most of the political rhetoric, aimed at the prevention of crime within the community, there is a frequent expression of ‘slippage’ between the community, the meaning of which has long been lost from the community as the point around which modern democratic institutions are built. The ideals of a community - reciprocity, intimacy and trust - seem to have an inappropriate connotation in today’s understanding of individuality, freedom and mobility. Accordingly, community-based initiatives sometimes tend to hold unrealistic expectations about what a community can do to reduce crime. Crime prevention literature even highlights the danger of communities becoming a party around which individuals and groups can be mobilized to take greater responsibility for their own well-being and safety. This abdication of responsibility by the state has implications for where the cost of providing security should lie in the same measure as the blame for failure. With the development of the market for security and with increasing funding for additional security patrols in communities, there is concern that some communities will have to do even better in how they shoulder the burden, while others may be criticized for their inability to prevent crime.

Focusing on communities bearing the burden of prevention raises a much more important question: to what extent are complementary aspects of community and society of the same rational range of management or differentiation and potential level of management competence? The justice of one community does not mean social justice. Certain solutions within the community tend to be particular and local, with little regard for the external and wider social environment. Well-defended local communities may have the purpose of dislocating crime to less well-defended residential areas. Or, as some criminologists claim, “the safety of one community can be at the expense of another.” Therefore, it would be desirable that security as a public good is not transformed into a local or exclusive good. Therefore, community



security is much less of a misnomer if it offers a space for political and ethical collective security, which together is much more than an individual security initiative (Kostiћ, 2019: 132-133).

The ethno criminological approach, in a cognitive and methodological sense, indicates that when it comes to issues of ethnicity in criminology, it is noted that in older sources this concept is most often linked to a critical attitude towards discrimination expressed in relation to certain ethnic groups and their characteristics and in terms of criminal etiology, i.e. a direct causal connection with certain types of crime. It is noticeable that attention is drawn in detail to the position of minority groups, critically reviewing various forms of discrimination committed against them. It links ethno features to ethnic minorities, and before that it writes about segregation, as well as minority groups in relation to race, ethnicity, religion. A special status in this should be the study of aging and ethnography, i.e. the status of the elderly and society's attitude towards them, in terms of age discrimination and social visibility (Dimovski & Kostić, 2019). Criticism of ethnocentrism is a mandatory way of noticing certain ethnological characteristics of the population, potential perpetrators or victims of crime in order to prevent and combat crime. Rigidity of attitudes is ethnocentrism, and the concentric circles of knowledge about customs, with their rules, with their trappings do not represent their abolition, but rather an understanding and introduction of modern forms of combating crime while respecting diversity. Movements of migrants in the first quarter of the 21st century represent an additional reason for drawing attention to ethno-criminology. In the literature, it is possible to find a connection between ethnocriminology and the criminology of colonialism. In particular, the questions of epistemology and research methodology were critically observed because this would achieve a critique of the social and historical denial of colonialism and racism.

In the reviewed articles from *Politika*, a relatively small number of articles appeared on the keyword ethnography. Apart from careful reading and trying to distinguish ethnology while linking this term with delinquency (evil) and studying marginalized social groups as well as minority groups, it was not an easy task. However, the mentioned writings, as examples of good practice, demarcate phenomena and concepts, point to old acquired knowledge that must be renewed. The media, printed and electronic, and especially those that have the status of respectable, like *Politika*, must be interested in it more. The articles that have been singled out as representative for research purposes have two content groups. Some come from interviews with experts and/or descriptions of their contributions to ethnography. Others are based on real events that are commented by experts or a journalist describes the phenomenon.

The articles reporting on the jubilee celebrations of scientific institutions in our country are also significant. One of the oldest institutes at the Serbian Academy of Sciences and Arts is the Ethnographic Institute, which celebrated seventy-five years of existence in 2022: "The key task that the academy then set before the new research unit was to "organize a systematic and planned study of settlements and the origin of the population, folk life, customs, beliefs and folklore in our country and among our peoples". At the end of the first quarter of the 21st century, the Institute's collaborators also deal with topics about new information technologies (among other things, folklore communication), environmental challenges and global migrations. In that *Politika* article, the conclusion made at the Institute's anniversary celebration is emphasized that anthropology must "interfere more" in society and play a more significant role in the process of making public policies (Pejović, 2022). Speaking at the Ceremonial Academy on the occasion of a significant jubilee, it was pointed out that ethnologists and anthropologists alike dwell in the past and in the present worlds: "Foreseeing the future, they know that cultures are continuums and that all events and changes have their beginnings somewhere and somewhere. The past is actually a road that forks towards different directions of the future" (Pejović, 2022).



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PREVENTION AND SUPPRESSION OF ARMS SMUGGLING IN THE REPUBLIC OF SERBIA

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ABSTRACT

Purpose: This paper aims to provide a comprehensive analysis of the mechanisms for countering arms smuggling in the Republic of Serbia through normative, institutional, and operational frameworks. Special emphasis is placed on identifying existing challenges in inter-institutional coordination, operational efficiency of competent authorities, as well as evaluating current legal solutions in terms of their compliance with international standards and obligations arising from the European integration process.

The aim of the paper is, through an interdisciplinary approach, to contribute to the improvement of security strategy and operationalization of measures for more effective prevention and suppression of arms smuggling, in accordance with contemporary security challenges and the international obligations of the Republic of Serbia.

Design/Methods/Approach: The research will be conducted as theoretical, which is why it will employ a combination of philosophical, general scientific, and logical methods. Among the philosophical methods, the study will utilize dialectical, positivist, and structuralist approaches. Among the general scientific methods, the research will apply historical-comparative analysis, comparative methods, statistical methods, and modeling. Within the corpus of logical methods, the study will employ analysis and synthesis, specialization and generalization, concretization and abstraction, induction and deduction, as well as definition and classification. The method of content analysis (both qualitative and quantitative) will be applied to relevant scientific and expert works available in scientific monographs, journals, and conference proceedings; documentation from relevant scientific research projects; and appropriate doctrinal and formal-legal sources.

Findings: Arms smuggling represents a complex and multidimensional security challenge with significant implications for national and regional security. The geopolitical position of the Republic of Serbia, located at the crossroads of key Balkan and pan-European routes, makes it particularly vulnerable to flows of illicit arms trafficking, both as a transit and as a destination country. The analysis also includes quantitative indicators regarding seizures and detected smuggling attempts, modalities of smuggling routes, as well as profiles of participants in these criminal activities. Furthermore, the paper discusses the importance of international police and intelligence cooperation, including engagement within mechanisms such as EUROPOL, SELEC, and FRONTEX. Based on identified weaknesses, guidelines are proposed for enhancing the strategic and tactical response of the state, which involve

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strengthening technical capacities, developing specialized units, improving criminal law legislation, and continuous training of personnel engaged in the prevention and suppression of arms smuggling.

Originality/Value: This paper presents an innovative and interdisciplinary approach to studying the mechanisms for preventing and suppressing arms smuggling in the Republic of Serbia, integrating normative, institutional, and operational dimensions. Special attention is given to identifying and analyzing key challenges in inter-institutional coordination and evaluating the compliance of the national legal framework with international standards, particularly within the context of European integration processes. The study contributes to the development of scientific literature by providing a systematic and theoretically grounded analysis based on a combination of philosophical, general scientific, and logical methods, as well as the application of qualitative and quantitative content analysis.

The scientific contribution of this paper lies in expanding existing theoretical frameworks in security studies and criminology through a specific analysis of arms smuggling in a geopolitically sensitive region, as well as in developing practical recommendations for improving state security policies. The research findings provide a basis for further empirical studies and enhance the understanding of the complexity of contemporary security threats.

The social contribution of this work is reflected in raising awareness about the seriousness of the arms smuggling problem and its impact on national and regional security, as well as promoting more effective prevention measures that can contribute to societal stability, strengthening the rule of law, and protecting citizens.

This paper holds significant practical value for improving security policies and operational measures and represents a relevant contribution to the further development of academic and professional discourse in the fields of security studies and criminology.

Keywords: arms smuggling, national security, organized crime, normative framework, police cooperation.

About the authors

Ilija Racić, PhD, was born on December 18, 1983, in Ivanjica. He graduated from the Higher School of Internal Affairs and the Criminal Police Academy according to the curriculum of the Police Academy in Belgrade, where he particularly distinguished himself during his studies by achieving an average grade of 9.25, which earned him an award from the Minister of Internal Affairs, ranking him among the top three students of his generation. In 2016, he completed second-cycle studies – specialist academic studies in criminology at the Criminal Police Academy in Belgrade, in the program “Executive Management in the State Administration System” with an average grade of 9.88, earning the professional title of “Criminology Specialist”. In April 2022, he became the first in the history of the Criminal Police University to successfully defend a doctoral dissertation titled “Organizational Adaptation of the Police to the Needs of Implementing the Police-Intelligence Model in the Republic of Serbia” at the Criminal Police University in Belgrade, at the department of criminology and law. He achieved an average grade of 9.12 throughout his studies, thus earning the title of Doctor of Criminology. By the decision of the Minister of Internal Affairs during 2015 and 2016, he participated as a member of the Working Group in the development of the first “National Strategic Assessment of Serious and Organized Crime Threat (SOCTA)” and the “Regional Strategic Assessment of Serious and Organized Crime Threat”. Furthermore, upon the decision of the Minister of Internal Affairs in 2016 he became a member of the POM Team and actively participated in the establishment and implementation of the police-intelligence model within the Ministry of Internal Affairs of the Republic of Serbia. In his



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By the decision of the Police Director from October 2016, he took part in the preparation of the first “Strategic Public Safety Assessment” and the first “Police Strategic Plan”. In 2018, he received the minister’s commendation for improving the work of the Ministry of Internal Affairs. Since January 1, 2019, by the decision of the Police Director, he has been permanently assigned to the Police Directorate headquarters as the Chief Coordinator, holding the rank of Police Lieutenant Colonel. Since May 18, 2023, he has been appointed as the Deputy Chief of the Police Director’s Cabinet, holding the rank of Police Colonel. In October 2023, he was appointed an Associate Professor at the Faculty of Business Studies and Law at the University “Union - Nikola Tesla” Belgrade, at the Department of Security and Political Sciences. He is a member of the Management Board at the Institute for Criminological and Sociological Research and a member of the editorial board of the journal *Bezbednost* (Security).

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INTRODUCTION

The genesis of weapon development is closely tied to the existence of humanity and the human need to create various tools for survival. The earliest “armed” objects were stones and bones; however, as humanity evolved, these objects gradually took on the form of “weapons” such as the bow and arrow. Their primary purpose was hunting and ensuring survival of humans as individuals, while their secondary purpose became defense against enemies and participation in conflicts among warring groups within communities. (Dupuy, 1990)

With technological progress and the discovery of iron and bronze, a revolutionary stage in the development of weapons began, marked by the emergence of the first swords, axes, and other items featuring sharpened blades. The invention of gunpowder in ancient Chinese civilization ushered in the era of firearms, introducing projectiles, explosions, and gunpowder-based barrels. The industrialization era and the advancement of technology led to the emergence of machine guns, tanks, aviation, submarines, radio-electronic, and nuclear weapons. The First and Second World Wars accelerated the



development of mass and industrial production, as well as the growth of expertise in weapon engineering. (Dupuy, 1990)

The evolution of weapon development, wars, uprisings, and the rise of organized crime have all contributed to the growing demand for weapons. This demand provided criminal groups with opportunities to generate illicit financial gain through the sale of arms. (United Nations Office on Drugs and Crime, 2022) In this sense, the term ‘arms smuggling’ arises, which encompasses the illegal transfer, sale or supply of weapons, ammunition, parts and other components without the necessary permits or contrary to national and international regulations. It can be said with certainty that arms smuggling originated alongside organized trade itself, when merchants and mercenaries historically transported weapons across the borders of different states. (Clarke, 2020)

The emergence of arms smuggling in the Republic of Serbia was influenced by numerous political and economic factors resulting from the wars of the 1990s, both in the territory of the former Socialist Federal Republic of Yugoslavia and in the area of the Autonomous Province of Kosovo and Metohija. The demand for weapons during the wartime period increased significantly, which consequently led to higher production in domestic factories, as well as smuggling and the purchase of weapons on the so-called “black market”. (Ministry of Interior of the Republic of Serbia, 2020) The mobilization of the population, that is, of militarily capable reservists, led to a situation in which weapons used during the conflicts were often not returned to military depots under the pretext that they had been “lost”. This enabled the illegal trade and sale of such weapons to criminal groups for the purpose of obtaining unlawful financial gain. (Foreign and Commonwealth Office, 2018) The rise of crime in the 1990s also created increased demand for weapons and stimulated organized production in illegal workshops, where unlawfully acquired weapons were frequently modified, falsified, or re-engraved with counterfeit markings. The end of the 20th and the beginning of the 21st century saw the emergence of large-scale stockpiles, specialized “brokers”, illegal trafficking routes, and covert deliveries. (Ministry of Interior of the Republic of Serbia, 2020)

The Republic of Serbia strives to establish a balanced state of protection for people and property, and to safeguard constitutionally and legally guaranteed human and minority rights and freedoms, including the promotion and support of the rule of law. This is achieved and maintained through the application of preventive and repressive measures within the scope of internal affairs. The objective of internal affairs operations is to enhance a comprehensive mechanism for identifying, preventing, prosecuting, and adjudicating offenses related to the illegal manufacture, possession, carrying, trade, and smuggling of firearms, their components, ammunition, and explosive materials, in accordance with international standards. (The Government of the Republic of Serbia, 2016)

Despite the fact that more than two decades have passed since the wartime events, arms smuggling in the Republic of Serbia continues to represent a strategic priority. This is evident in the domains of prevention (through national strategies), operational procedures, and normative regulation — all of which constitute the subject of research in this article. (UNDP SEESAC, 2004)

STRATEGIC MEASURES IN THE PREVENTION AND SUPPRESSION OF ARMS SMUGGLING IN THE REPUBLIC OF SERBIA

Based on the international obligations assumed under the United Nations Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects, the United Nations Convention against Transnational Organized Crime and its accompanying Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and



Ammunition, as well as the Organization for Security and Co-operation in Europe (OSCE) Document on Small Arms and Light Weapons and the OSCE Document on Stockpiles of Conventional Ammunition, the Republic of Serbia adopted the Strategy for the Control of Small Arms and Light Weapons in the Republic of Serbia for the period 2010–2015. This Strategy represents the first national-level strategic document defining institutional activities in the Republic of Serbia aimed at reducing the risks associated with small arms and light weapons in all aspects of security. (The Government of the Republic of Serbia, 2010)

Considering that European integration and membership in the European Union represent a national interest and a strategic commitment of the Republic of Serbia — and that the values of the European Union are the same values that the Republic of Serbia supports and seeks to further promote — in order to fulfil the requirements for opening Negotiation Chapter 24 – Justice, Freedom, and Security, which includes the area of small arms and light weapons (SALW) control, the Government of the Republic of Serbia adopted, at its session held on 24 May 2016, a negotiating position by which the Republic of Serbia undertook the obligation to align with the EU *acquis communautaire* in Chapter 24 and to be fully prepared for its implementation by the time of accession. (The Government of the Republic of Serbia, 2016)

Additionally, within the framework of the Berlin Process — a diplomatic initiative focused on the future enlargement of the European Union — at the London Summit, held from 9 to 10 July 2018, the Roadmap for a Sustainable Solution to the Illegal Possession, Misuse, and Trafficking of Small Arms and Light Weapons and Their Ammunition in the Western Balkans by 2024 was confirmed. (UNDP SEESAC, 2019) Given that the development of various forms of serious and organized crime has been driven and strengthened by the increased quantity and availability of illegal firearms — as evidenced by the amount of seized weapons and the rising number of incidents involving firearms and explosive devices, which indicate a high potential threat to public security — the Republic of Serbia adopted the Strategy for the Control of Small Arms and Light Weapons for the period 2019–2024 (hereinafter: the Strategy). This Strategy represents a continuation of the efforts of Serbian institutions to reduce the risks associated with small arms and light weapons in all aspects of national security. (The Government of the Republic of Serbia, 2019)

The Strategy was adopted with the aim of ensuring the safety and security of citizens through the effective and efficient control of small arms and light weapons, by establishing a comprehensive and sustainable mechanism for identifying, preventing, prosecuting, and adjudicating cases of illegal possession, misuse, and trafficking of firearms, ammunition, and explosive materials. To ensure the realization of all undertaken obligations, the Republic of Serbia created a mechanism for effective planning and monitoring of efforts in the field of SALW control at both strategic and operational levels. Within this established mechanism, the Government of the Republic of Serbia formed the Council for the Control of Small Arms and Light Weapons. To enable the implementation of the planned efforts by the Council's members, the Minister of the Interior established a Special Working Group consisting of 37 members from 18 institutions, with the main task of continuously monitoring and assessing the impact of SALW-related issues on society and the general security of citizens, as well as submitting initiatives to the Council for the development of new policies in the field of small arms and light weapons control. (European Parliamentary Research Service, 2024)

The established mechanism was designed to facilitate the fulfilment of the Republic of Serbia's obligations in the area of SALW control through the implementation of two key documents: The Strategy for the Control of Small Arms and Light Weapons in the Republic of Serbia for the period 2019–2024, and The Roadmap for a Sustainable Solution to the Illegal Possession, Misuse, and Trafficking of Small Arms and Light Weapons and Their Ammunition in the Western Balkans by 2024. The goal of imple-



menting these documents is to meet the sole defined interim benchmark for the field of small arms and light weapons that the Republic of Serbia received upon opening Negotiation Chapter 24 – Justice, Freedom, and Security. (OEBS, 2024)

As all partners in the Western Balkans reaffirmed the Roadmap for a Sustainable Solution to the Illegal Possession, Misuse, and Trafficking of Small Arms and Light Weapons, Ammunition, and Explosives in the Western Balkans by 2030 during the EU–Western Balkans Ministerial Forum held in Budva on 28–29 October 2024, work commenced on the development of a new public policy document — the Programme for the Control of Small Arms and Light Weapons, Ammunition, and Explosive Materials, accompanied by an Action Plan, in accordance with the Law on the Planning System of the Republic of Serbia, and with the goal of harmonization with the revised regional Roadmap for the Western Balkans by 2030. (The Government of the Republic of Serbia, 2025)

The Programme for the Control of Small Arms and Light Weapons, Ammunition, and Explosive Materials in the Republic of Serbia for the period 2025–2030 represents a continuation and expansion of activities aimed at strengthening the efficiency of all relevant entities involved in the field of SALW control in the Republic of Serbia.

The Programme focuses in particular on:

- further alignment of national legislation with international standards;
- intensifying efforts to suppress misuse, illicit manufacturing, illegal possession, carrying, storage, trade, and diversion of firearms, ammunition, and explosives from legal to illegal channels;
- strengthening institutional capacities for the regular control of legal flows of small arms, ammunition, and explosives;
- improving the control of domestic and foreign trade in arms;
- reducing incidents committed with firearms and lowering the number of illegally owned weapons among citizens;
- raising public awareness of the dangers of illegal possession and irresponsible use of firearms, ammunition, and explosives;
- removing surplus small arms, light weapons, ammunition, and explosive materials from stockpiles in Serbia;
- enhancing multilateral and bilateral cooperation in this domain. (Small Arms Survey, 2024)

Furthermore, the adoption of the Programme for the Control of Small Arms and Light Weapons in the Republic of Serbia for the period 2025–2030 is intended to ensure the fulfilment of indicators defined within the EU Growth Plan for the Western Balkans. Within the Growth Plan, three key indicators have been established in the area of SALW control:

- the adoption and implementation of the new public policy document;
- the adoption and implementation of amendments to the Criminal Code;
- the adoption and implementation of a new Law on Weapons and Ammunition. (European Parliamentary Research Service, 2024)

Following the tragic events at *Vladislav Ribnikar* Elementary School in Belgrade and in the village of Dubona near Mladenovac in May 2023, the Ministry of the Interior launched a comprehensive national campaign for the surrender of unregistered firearms. The campaign lasted from 8 May to 30 June 2023 and was implemented in cooperation with international partners. As part of the campaign, three informational video spots were produced and broadcast on all national, regional, and local television stations. In addition, two types of informational flyers were designed and distributed across all cities and municipalities throughout Serbia. The campaign featured a strong visual identity — approximately 750 billboards, both LED and printed, were placed at key locations to encourage citizens to voluntarily surrender weapons. Intensive communication was also conducted via the Ministry's



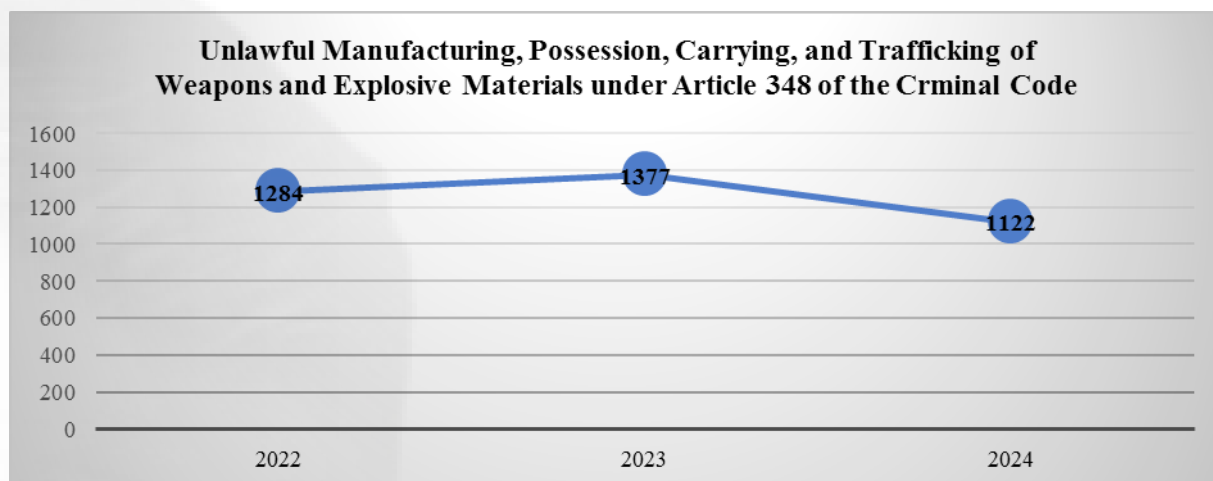
official social media accounts (Facebook, Instagram, TikTok, YouTube), as well as through media appearances by police officers in both printed and electronic outlets. As part of these efforts, three additional educational video clips were produced, aimed at raising public awareness regarding the safe storage and handling of firearms. (Ministry of Interior of the Republic of Serbia, 2023)

OPERATIONAL MEASURES AIMED AT PREVENTING AND SUPPRESSING ARMS SMUGGLING IN THE REPUBLIC OF SERBIA

For the purposes of this study, operational measures aimed at preventing and suppressing arms trafficking in the Republic of Serbia are understood as a set of criminal-intelligence activities implemented through the criminal-intelligence cycle, whose decision-making processes are supported by produced criminal-intelligence information. The first function of the criminal-intelligence cycle encompassed the application of planning and processing functions, under which the then Minister of the Interior issued the Order on the Surrender of Unregistered Firearms from 8 May to 30 June 2023, thereby improving the procedure for surrendering weapons. Media campaigns were conducted, three informational video spots were produced, and 750 billboards were designed across Serbia; two types of informational flyers were printed; a large number of visuals and two types of info-cards were posted on social media; and more than 300 media appearances by police officers were realized on various television stations. All of the above contributed to an increased number of voluntary surrenders of unregistered firearms, ammunition, and explosive devices. During the period covered by the Order, citizens surrendered 32,926 pieces of unregistered firearms, 3,864,898 rounds of ammunition that were held without authorization, and a large quantity of gunpowder and explosives. In the period from 16 March 2020 to 17 August 2020, an amnesty/legalization of weapons was carried out during which a total of 146 firearms, 11 bombs, 10 explosive devices and 2,977 rounds of ammunition of various calibres were surrendered. (Ministry of Interior of the Republic of Serbia, 2023)

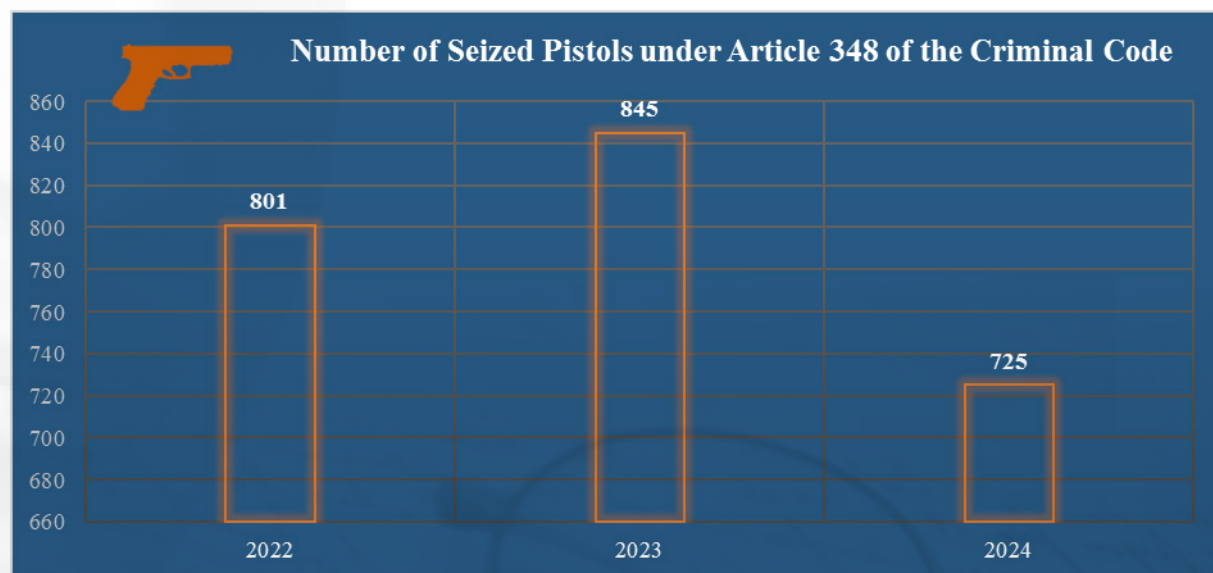
The analytical function pointed to significant statistical data indicating trends in arms smuggling in the Republic of Serbia, *modus operandi*, smuggling routes, and international cooperation, which are further elaborated in the text. The accumulated quantities of firearms in the Western Balkans continue to represent a serious security risk, since these weapons are used daily for smuggling, organized crime, and various other criminal offenses, including domestic homicides. Illegal weapons are smuggled into Serbia from the territory of Bosnia and Herzegovina, Montenegro and the Autonomous Province of Kosovo and Metohija, as well as from Turkey via Bulgaria and North Macedonia, and are then frequently transferred further to Western European countries (Belgium, France, Norway, and Denmark). There is an increasing tendency to smuggle convertible weapons (gas, starter and signal pistols) from Turkey and Bulgaria, which are illicitly converted into firearms in illegal workshops in the territory of the Autonomous Province of Kosovo and Metohija. Police officers find weapons concealed in passenger vehicles, trucks and buses in specially constructed hiding places — bunkers — most often light weapons such as pistols, revolvers and automatic rifles. (Frontex, 2023)





Graph No. 1: Overview of the Criminal Offence of Unlawful Manufacturing, Possession, Carrying, and Trafficking of Weapons and Explosive Materials under Article 348 of the Criminal Code²

In the period from 2022 to 2024, a total of 3,783 criminal offences of Unlawful Manufacturing, Possession, Carrying, and Trafficking of Weapons and Explosive Materials were recorded. The lowest number of such offences was registered in 2024 (1,122 cases), representing a 25% decrease compared to 2023 (1,377 cases), when the highest number of these offences was recorded. In terms of the gender structure of offenders under Article 348 of the Criminal Code of the Republic of Serbia, male perpetrators are overwhelmingly dominant. Regarding the age structure, all adult age groups are almost equally represented among the offenders. Of particular concern is the emergence of juvenile offenders among those committing this criminal offence.



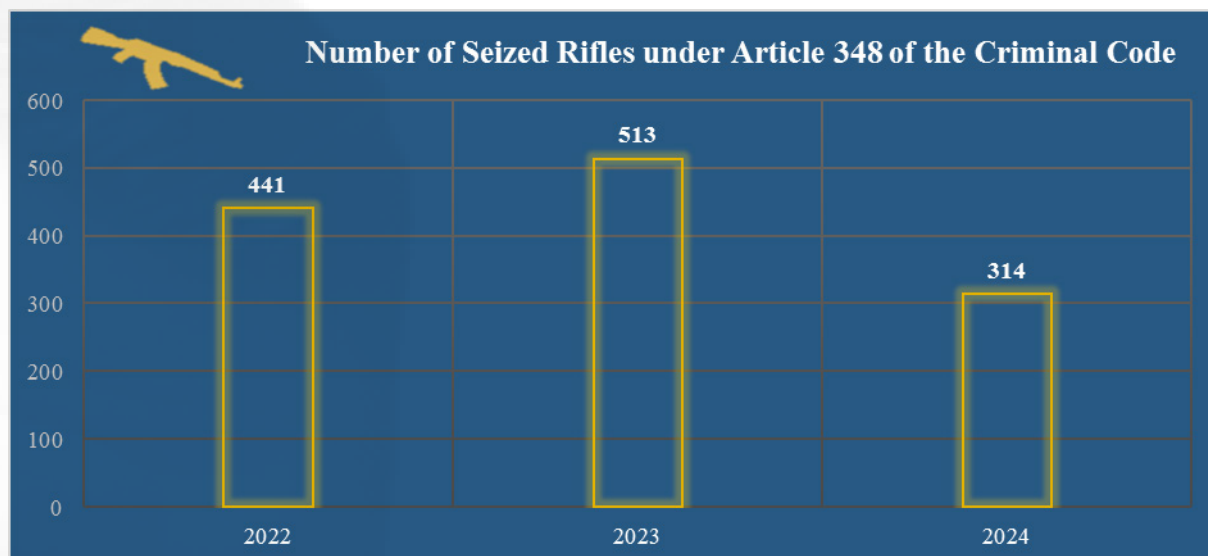
Graph No. 2: Number of Seized Pistols under Article 348 of the Criminal Code³

During the observed period, a total of 3,948 firearms were confiscated. The lowest number of seizures was recorded in 2024 (1,100 firearms), representing a 20% decrease compared to 2023 (1,380) and

² Statistic data of the Ministry of Interior.

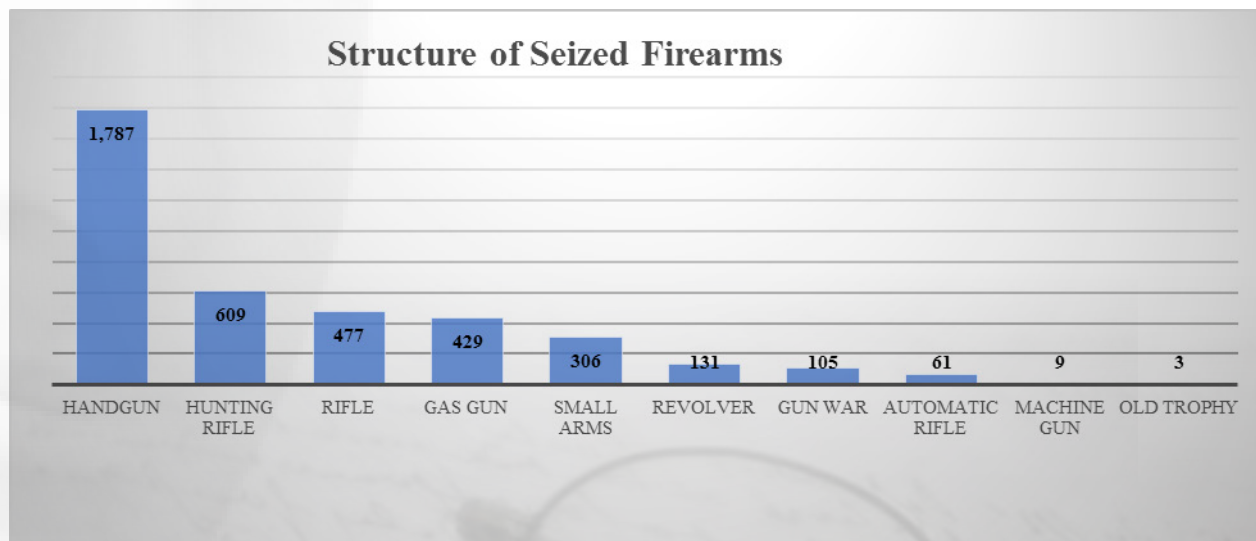
³ Ibid

a 25% decrease compared to 2022 (1,468). The majority of seized weapons were pistols (on average around 800 units) and hunting rifles.



Graph No. 3: *Number of Seized Rifles under Article 348 of the Criminal Code*⁴

In addition to pistols, a significant quantity of rifles was also seized (314 in 2024), representing a 39% decrease compared to 2023 and a 29% decrease compared to 2022. A total of 95,526 rounds of ammunition were confiscated, with the highest amount recorded in 2024 (35,325 rounds). The quantities of rifle and pistol ammunition seized were almost equal.



Graph No. 4: *Structure of Seized Firearms*⁵

From the perspective of international cooperation, significant contributions have been made with Europol, which is assessed as highly important in preventing and combating various forms of serious and organized crime. Based on cooperation with Europol, Serbia achieves excellent results, as evidenced by the number of activities in which it participates and the continuous increase in the number of mes-

⁴ Ibid

⁵ Ibid

sages exchanged via the SIENA channels, made possible through Europol's support. (European Parliamentary Research Service, 2024) Special consideration has been given to Europol priorities according to the EMPACT Policy Cycle, supported by the establishment of a Working Group that monitors these activities. The Ministry of Internal Affairs participates in a total of 73 operational activities under all 10 EMRAST Operational Action Plans for the 2024–2025 period, acting as co-leader in four of these operations. For the tenth consecutive time, Serbia also participated in the joint Southeast Europe Action Days. (The Government of the Republic of Serbia, 2025)

The commitment of the Ministry of Interior to preventing and suppressing serious and organized crime in the period from 2019 to 2024 can also be observed through the operational results achieved in combating the illegal possession and misuse of firearms, ammunition, and explosive devices. During this period, a total of 9,116 pieces of various firearms, 230,043 rounds of ammunition of different calibres, and 702 grenades and other explosive devices were seized. Enhanced information exchange is carried out during participation in operational actions in accordance with the EMRIT operational action plans, with the note that active participation of our representatives in EMPACT operational activities for the Firearms priority has been ensured since 2020 (in 2020 we participated in a total of 6 operational actions, in 2021 in 6 operational actions, in 2022 in 7 operational actions, in 2023 in 7 operational actions, and in the upcoming two-year period participation in 9 operational actions is planned). (Small Arms Survey, 2024)

REGULATORY MEASURES AIMED AT PREVENTING AND COMBATING WEAPONS SMUGGLING IN THE REPUBLIC OF SERBIA

Regulatory measures in the field of small arms and light weapons (SALW) control in the Republic of Serbia aim to align domestic legislation with international obligations, specifically frameworks established by the United Nations, OSCE, European Union, and the regional Western Balkans Roadmap for addressing illegal possession, misuse, and trafficking of small arms, ammunition, and explosives. (United Nations, 2004) Key issues identified in the regulatory framework include the development and amendments to the Law on Weapons and Ammunition. During 2021 and 2022, two drafts of amendments were prepared and subjected to public consultation, with corresponding reports drafted. Following tragic events in Serbia — specifically the shooting at the *Vladislav Ribnikar* Primary School and the mass killing in Dubona — in May 2023, the Government issued Conclusion No. 37, instructing the Ministry of Internal Affairs to prepare amendments to the law to tighten conditions for possession and carrying of short firearms. These amendments have not yet been adopted. (Small Arms Survey, 2024)

Additionally, the Ministry of Justice, on the initiative of the Ministry of Internal Affairs, prepared a draft amendment to the Criminal Code, modifying the existing Article 348 and introducing five criminal offenses related to illegal possession, carrying, production, trafficking, and smuggling of firearms, ammunition, and explosives, as well as unauthorized testing, stamping, marking, or forgery of marks and stamps on weapons, devices, or ammunition. (European Parliamentary Research Service, 2024)

In the field of export and import controls of arms and military equipment, in addition to the main Law, all accompanying by-laws necessary for its implementation have been adopted, fully aligned with the relevant European Union regulations and international standards in this area. The aforementioned Law, as well as the by-laws, were adopted in 2014 and have been in force since then. The legislative and regulatory framework for issuing licenses for the export and import of arms and military equipment,



as well as for the provision of brokering services and technical assistance, was established in the Republic of Serbia in 2014, with the entry into force of the above-mentioned Law and the accompanying by-laws. A National Annual Report on the export and import of arms and military equipment, the provision of brokering services, and technical assistance is regularly prepared and submitted to the Government for adoption, and to the National Assembly for information, along with regular annual reports prepared in accordance with the country's international obligations arising from its membership in international organizations. (OEBS, 2024)

CONCLUSION

The Republic of Serbia, due to its geographical position, will remain predominantly a transit country in the smuggling of weapons, while a portion of the weapons will be intended for the local market. The 2023 Serious and Organized Crime Threat Assessment of the Republic of Serbia identifies, as a key assumption regarding future developments, the expected emergence of Flobert-caliber weapons, deactivated and acoustic weapons that may subsequently be reactivated, i.e., restored to their original caliber. The emergence of 3D-printed weapons is also anticipated. Such weapons are not yet present in the Republic of Serbia; however, there is a possibility that they will soon appear on the illegal market. A priority of the Ministry of Interior will be to fulfill the overarching objectives of the Small Arms and Light Weapons Control Programme of the Republic of Serbia for the period 2025–2030, through reducing threats stemming from the illicit manufacture, possession, carrying, trafficking, and smuggling of firearms, their components, ammunition, and explosive materials, as well as through a comprehensive criminal-justice response. The Republic of Serbia has committed to harmonizing its legislative and regulatory framework on the control of firearms, ammunition, and explosive materials with international standards; improving evidence-based and intelligence-led arms-control policies and practices; strengthening national mechanisms for combating misuse, illicit manufacture, illicit possession, carrying, trafficking, and smuggling of firearms, ammunition, and explosive materials; reducing supply, demand, illicit trade, misuse, and unlawful production, possession, carrying, and smuggling of firearms, ammunition, and explosives through preventive and control measures; and reducing the risk of proliferation and diversion into illicit channels by enhancing stockpile security, safety, and disposal measures. The results of these objectives will become measurable after 2030, which marks the end of the Action Plan's implementation period.

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POLICE SCIENCES BETWEEN THEORY AND PRACTICE: AN EVALUATION OF SCIENTIFIC GROUNDS THROUGH THE PRISM OF THE CONSTITUENTS OF SCIENCE

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ABSTRACT

Purpose: This paper aims to conduct a theoretical analysis of the fundamental constituents of police sciences and assess their level of scientific grounds against the core elements that define any academic discipline.

Design/Methods/Approach: A systematic review of relevant literature was carried out and benchmarked against widely accepted standards of scientific rigor. Selected subfields of police sciences (police organization and tactics, police ethics, traffic safety from a policing perspective, police-criminalistics topography, and specialized physical education for law enforcement) were evaluated according to criteria such as research subject, methodology, terminology, theoretical framework, empirical basis, logical coherence, value system, institutional embedding, and societal context.

Findings: The analysis demonstrates that all considered disciplines within police sciences satisfy the essential requirements of a scientific field: they possess a clearly defined subject matter, employ valid research methods, develop specialized terminology and theoretical models, rely on empirical studies, exhibit coherent, logical structures, uphold professional values, enjoy institutional support, and address pertinent needs of the social environment.

Originality/Value: This study provides the first comprehensive theoretical evaluation of the scientific foundations of police sciences through a detailed examination of their constitutive elements. It establishes a robust basis for their equal recognition among academic disciplines and promotes enhancing police education, research, and practice.

Keywords: police science; scientific disciplines; scientific methodology; the constituents of science; scientific basis

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INTRODUCTION

The modern era is characterized by the rapid development of science and technology, which brings new, previously unimaginable security challenges to police forces around the world (Milojević & Janković, 2022). Crime utilizes scientific advances and sophisticated technologies, making police work increasingly complex and demanding (Banović & Amanović, 2022). At the same time, there is a growing need for the police themselves to be based on science, in order to organize the police more efficiently, apply effective tactics and respect high professional standards. This trend has led to the formation of a special field of police science, which deals with the study of the police as an institution and policing as a process, applying scientific methods and knowledge from multiple disciplines (Nagel & Vera, 2020; Milojević et al., 2025a; Milojević et al., 2025b).

Police sciences encompass a wide range of topics related to police activity – from the strategies and organisation of police services, through the tactics of police officers in the field, to forensic methods and technological tools, as well as the ethical and legal aspects of police conduct. Different scientific disciplines within police science are focused on specific segments of the field:

- Police ethics as a knowledge-theoretical discipline studying ethical principles in police work, value dilemmas and standards of professional behavior of police officers. As such, it contributes to increasing the abilities of police officers by completing their awareness of the close connection between professional service and morality, i.e. engagement that would maximally bring their service into line with the purpose of its humanistic and democratic-emancipatory mission. At the professional-official level, it contributes to strengthening the awareness of police officers about their moral duties and the need to improve their own moral habitus, thereby enhancing the quality and success of their work, which in turn manifests the ethical and humanistic immanence of the police service.
- Police Organization and Tactics which studies the organizational structure and function of the police in environmental conditions, to maximize the legality, effectiveness and efficiency of the police organization. It also deals with the planning and execution of police actions and operations in accordance with the concept of safe community, in partnership and on an equal footing, according to which the police in each country and other law enforcement agencies have a multi-agency approach to fighting crime, protecting public order, personal and property security of citizens and in response to current security challenges, risks and threats;
- Police and Criminal Topography as a theoretical and practical scientific discipline that studies the fundamental properties of graphic, photographic, digital and other geotopographic materials, as well as the methods of determining the values of horizontal and vertical sizes of elements of geospatial content, as the key determinants of tactical, fire, criminalistic-operational and technical measures, activities and actions in police proceedings, and their simultaneous graphic



representation in the form of a sketch, panoramas, schemes, plans and maps in the field or thematic-cartographic modelling of the peculiarities of manifestations of forms of crime within the bureau.

- Traffic safety (social aspect) which focuses on the role of the police in improving road safety, preventing traffic accidents, and controlling and regulating traffic. It is a theoretical and empirical scientific discipline that studies the interdependence between traffic and social processes, on the one hand, and the adverse effects and consequences of traffic, on the other. It researches and attempts to discover the laws governing the occurrence of adverse effects and consequences of traffic, to optimize the traffic process and mitigate these effects and consequences by addressing the social aspects of the problem.
- Special Physical Education for the Police (SFO) refers to the physical preparation of police officers and the specific skills (e.g. martial arts, dexterity, and fitness) needed to perform police tasks. Namely, SFO deals with the study of anthropomorphometric characteristics, physical abilities, and skills necessary for the professional competence of police officers, security guards, and rescue services. SFO has been developed in the field of physical education and sports, aiming to improve professional competence through the optimization of basic and specific physical abilities, cognitive characteristics, and emotional resilience, with effective adaptation to professional challenges. In addition to increasing work efficiency, the task of the SFO is to develop appropriate lifestyle habits that contribute to maintaining a healthy status during the working career.

It is crucial to note that each of these disciplines aims to produce science-based knowledge about relevant phenomena, processes, and techniques, with the ultimate goal of enhancing police practice and citizen safety.

However, although police science in the world has long been developed within academic and research institutions, it is not always treated on an equal footing with “traditional” scientific fields. In the Republic of Serbia, for example, police sciences are not yet formally recognized in the official classification of scientific fields, even though they have existed *de facto* for decades in educational and scientific institutions of the police (Banović & Amanović, 2017; Nagel&Vera, 2020; Banović & Amanović, 2022; Milojević et al., 2025a; Milojević et al., 2025b). This necessitates a clear articulation of the scientific basis of police science, enabling it to achieve its well-deserved status in the scientific community.

The main research question of this paper is whether the scientific disciplines of police science meet the criteria of science that are common for other scientific disciplines. In other words, the goal is to determine whether the disciplines of police science possess all those constituents that characterize a field as scientific. According to classical understandings in the methodology of science, such constituents include a clear object of study, a developed research methodology, special terminology, a built theoretical system based on an empirical basis, an appropriate logical structure of theoretical assumptions, an inherent value system, an institutionalized framework of action, rootedness in the social context and the fulfilment of an educational function (education of new personnel) (Milašinović & Milojević, 2016). The following sections discuss each of these elements in detail within the context of police science.

The theoretical and practical significance of this paper is reflected in its provision of a systematic overview of the scientific foundations of police disciplines. This contributes to the integration of knowledge developed in the police context into a broader body of science, as well as to advocating for the equal treatment of police science alongside other scientific fields. If their scientific validity is proven, it creates a basis for further strengthening of the police education and research, as well as for formal institutional recognition of police science (e.g. through the introduction of a specific scientific field into the official classification, as proposed in the literature (Banović & Amanović, 2022; Milojević et al.,



2025a; Milojević et al., 2025b). Additionally, emphasizing the scientific dimension of police skills and knowledge can enhance everyday police work by applying research results and theoretical knowledge.

APPROACH TO RESEARCH: METHODOLOGICAL FOUNDATIONS AND ANALYTICAL CRITERIA

The conducted research has the character of a theoretical and methodological analysis based on the study of the available literature. A qualitative approach has been applied, which includes: (1) analysis of the content of scientific and professional-methodological papers in the field of police sciences and general methodology of science, and (2) comparative analysis of the characteristics of police disciplines in relation to generally accepted criteria of science.

In particular, a list of ten constituents of science was used as an analytical framework: subject, methodology, terminology, theoretical system, empirical basis, logical structure, value system, institutional framework, social context and educational function. This list is derived based on methodological guidelines in science and is presented in the introduction of the paper. Each of these elements is operationalized through a set of questions: e.g. for the subject of study – what is the basic object of research of a given discipline; for methodology – what scientific methods are used and developed; for terminology – whether there is an established professional language and glossary; etc., (Milašinović & Milojević, 2016). Based on these questions, an evaluation of the situation in police science was carried out, supported by citations and findings from the literature.

The data sources included relevant scientific articles and monographs published in the last 25 years (approximately 2000–2025), ensuring that the considerations are up-to-date. Special attention is paid to the works of authors from the region (Serbia, Western Balkans region) who deal with the development and status of police science (e.g. Milašinović, Milojević and Milojković, Banović and Amanović, Kešetović et al.), but international sources in English who treat the concept of police science (e.g. Bruno, 1989; Buturac & Solomun, 2013; Wood, D., et al., 2017; Nagel & Vera, 2020). This enables us to examine both global trends and the local context.

It should be emphasized that the research method is predominantly descriptive-analytical and comparative. No original empirical research has been conducted for this paper. Instead, we have relied on already published empirical studies and meta-analyses as evidence of the existence of an empirical basis in police science. During the analysis, the historical method was also employed in the form of a brief review of the genesis of police science to gain a more complete understanding of its current status. However, the focus of the paper remains on contemporary theoretical and methodological characteristics. By combining these methodological approaches, the authors aimed to objectively and comprehensively evaluate the scientific foundation of police disciplines.

SYSTEMATIC FINDINGS ON THE SCIENTIFIC STRUCTURE OF POLICE DISCIPLINES

Object of study

The object of study of a scientific discipline is the set of phenomena, processes, or entities that it investigates. The establishment of a clear and defined object of study is the first step in the constitution of any science. For example, the subject of biology encompasses living organisms and life processes;



the subject of economics involves economic relations and activities; the subject of law pertains to legal norms and order. Therefore, for police science to be considered a scientific discipline, it must have a clearly defined object of research.

In the case of police science, the subject of study is relatively broad, yet determined: it encompasses all relevant phenomena related to the police and their work. Banović and Amanović (2022) explicitly state that the subject of police science encompasses police institutions (systems), crime, police affairs, police personnel, the effects of police work, and methodology for researching police phenomena. Such a definition of the subject indicates that police sciences focus on the organization and functioning of the police (institutions, personnel, jobs), as well as on the phenomena of crime to which the police respond, and on the results or efficiency of police activities. It is also significant that the methodology of researching police phenomena is introduced into the subject, which means that police sciences reflexively study their own methods of work.

Narrowly speaking, each discipline within police science has its own specific focus area, as follows:

- Police ethics has as its subject of research the ethical dimension of the police service in a modern democratic society. It represents a general and organized ethical thinking and knowledge of the moral dimension of professional practice in the police domain. Knowledge endeavor within its framework is manifested as: ethical observation, description, explanation, evaluation, and recommendation of specific professional morality of the police service (work ethic), as well as solving dilemmas in police work.
- The organization and tactics of the police for the subject of the research have the structure (strategic, coordinating and tactical level) and function (management and execution) of the police in interaction with its environment, and investigates the most optimal tactical procedures in maintaining public order and peace, preventing and combating crime, etc.
- The Police and Criminal Topography subject of the research is analog and digital geodetic plans, topographic and photo maps, as well as maps of crime and other police thematic maps that belong to the group of social or socio-economic thematic maps, as its specific theme, as well as ways of digital cartographic visualization, geospatial, temporal and purposeful variability of crime and purposeful use sources of necessary geospatial data in the decision support system in all conditions of police interventions;
- Traffic safety (social aspect) has as its subject of research the interdependence between traffic and social processes, on the one hand, and adverse effects and consequences of traffic, on the other, i.e., it investigates the laws of the occurrence of adverse effects and consequences of traffic, intending to optimize the traffic process and reduce negative impacts on traffic safety through the research of the impact of four basic factors: driver – vehicle – road – environment (e.g., human behaviour, abilities and skills of the driver, technical specifications of the vehicle, characteristics of the social environment, regulations, police coercion, etc.).
- Special Physical Education for the Police, as part of its subject of research, has the development, implementation and evaluation of educational programs, as well as techniques and tactics that contribute to the effective resolution of problem situations of escape, self-harm, resistance and attack. Additionally, SFO is involved in the selection and analysis of cause-and-effect relationships between various cognitive and conative factors, physical abilities, and the study of anthropometric characteristics and specific aspects of health status.

Regardless of this diversity, all these disciplines share a common link – they study aspects of police activity as a specific social mechanism for maintaining public order, enforcing laws and protecting the security of citizens. Thus, a unique broader field of police science is police activity and phenomena related to it.



It is essential to note that the subject of police science is multidimensional and closely intertwined with the fields of other social sciences and the Humanities. Crime, as a social phenomenon, is also studied in sociology, criminology, psychology, and jurisprudence, among other fields. However, the specificity of police science lies in its examination of these phenomena from the perspective of police practice and function. The focus is on the role of the police in preventing and suppressing crime, as well as maintaining security. According to Milašinović and Milojević (2016), in studying these phenomena, police scientists integrate knowledge from several other sciences, applying it to their subject. This means that police science “borrows” theories and methods from sociology, criminology, psychology, law, forensics, computer science, and even technical sciences, but adapts and directs them towards solving police problems. Such a multidisciplinary approach allows the subject of police science to be viewed more fully, from several angles, thus enriching the knowledge itself within other areas from which theories and methods are “borrowed”.

We can conclude that police science undoubtedly has a clearly defined object of research and that is the police and everything related to them. This thematic area is specific enough (focused on the police system and its activities) and yet broad enough to encompass various phenomena (from the organization of the service to the behavior of individuals, from local security to global trends in crime). This fulfils the first condition of science - the subject of police science is determined and socially relevant. This societal relevance is reflected in the fact that issues of public safety, the rule of law and the fight against crime are of fundamental importance to society, which makes the subject of police science not only clearly delineated, but also worthy of scientific study.

METHODOLOGY

Another key constituent of science is methodology – a set of scientific methods and procedures that the discipline employs to acquire new knowledge. Scientific methodology implies systematic and objective repeatability and verifiability in the collection and analysis of data. For the classical sciences, such as physics or biology, the methodology is strictly defined (experiments, observations, statistical analyses). The question arises: to what extent do police scientists apply scientific methods in their study of their subject?

The answer is yes – police science has developed its own research methodology over the last few decades, relying on the methodologies of the parent disciplines from which it draws knowledge. Modern technologies and special methods for collecting data and combating security threats are increasingly used in the operational work of the police (Milojković & Petrović, 2019). For example, geospatial analysis of the distribution of emerging forms of crime, aided by geographic information systems (GIS), is used to map crime hotspots, address location issues, and plan proactive police action. Statistical models are applied to predict criminal trends; forensic laboratory methods are used to collect evidence at the scene of a crime; psychological testing and sociological research are used to study the behavior of criminals and the community. All of these methods are actually scientific methods adapted to the specific needs of police research.

Academic institutions and research centres related to the police are increasingly functioning like classical scientific institutes. Alimpić (2018) notes that analytical and strategic services in the police, which are responsible for police development, are becoming increasingly similar to scientific institutes in terms of methodology and work approach. They employ scientific approaches – collecting data, formulating hypotheses (e.g., about the causes of a specific type of crime), testing different measures (e.g., pilot projects), and evaluating the outcomes. Such an approach clearly reflects the application of the scientific method in the police domain. In addition, there is a growing “evidence-based” policing



movement worldwide that emphasizes that police tactics and strategies should be based on empirical research and evidence of effectiveness, rather than intuition or tradition (Farrington et al., 2002; Lum & Koper, 2017; Pisa & Welsh, 2022). In the professional education and training of police officers globally, the scientific method is becoming the leading approach, meaning that police officers are trained to think critically and in an exploratory way, using data and analysis in decision-making (Bayley, 1994; Braga & Tucker, 2019).

Police science does not rely on a single method, but on a plurality of methods. Since the subject is complex and multidisciplinary, the methodology includes: qualitative methods (e.g., interviews with police officers and citizens, observation of police work), quantitative methods (statistical analyses of crime, surveys on public attitudes), experimental approaches (e.g., controlled experiments in the community – testing different models of patrolling and comparing results), action research (where researchers and police jointly implement and evaluate a specific intervention) and more. For example, one of the methodologies that has emerged is the concept of “embedded criminologist” – hiring criminologists as researchers within police departments to continuously collect and analyze data on crime problems (Braga & Davis, 2014). Such an approach enables the literal incorporation of scientific knowledge into everyday police practice, allowing for the solution of problems based on the study of facts rather than relying solely on experience.

It is also important to note that police science develops its own methods tailored to its needs. For example, the method of crime analysis is specific to the police sector – it is the application of analytical techniques to identify crime patterns and propose proactive measures. Profiling offenders is also a method developed by experts in psychology, geoinformation sciences and police practice. Furthermore, police science is increasingly utilizing simulation techniques (computer simulations of scenarios), operational research (the application of mathematical models to optimize patrol routes or incident response, thereby shortening response times), and other methods. Special indicators and metrics are being developed to measure the success of police activities (e.g., community safety indices, indicators of public trust in the police) – all of which belong to the methodological instruments of discipline.

As a confirmation that the methodology of police science is scientific, we can point to a large number of research studies published in recent years that use rigorous methods. For example, randomized controlled trials (RCT experiments) have been conducted in the field of patrolling “crime hotspots”, where scientists and police collaborated to test the effect of increased police presence in selected micro-locations and to determine a significant reduction in crime in these zones (see e.g., Weisburd et al., 2016). Likewise, meta-analyses of multiple studies (Braga et al., 2019) have provided a synthesis of evidence used for the work in policing tactics (such as problem-oriented policing or community-based policing). All this testifies to the fact that police science actively applies modern scientific methodology and contributes to the scientific base.

In short, the methodology of police science is scientific, systematic and diverse. It not only uses the methods of other social sciences, but also develops its own specific methodological approaches in accordance with the nature of police phenomena (Milašinović & Milojević, 2016). Thus, it meets the second important criterion of science – reliable and verifiable methods for generating knowledge.

TERMINOLOGY

Gradually, each scientific discipline has developed its own professional language – a set of terms and definitions that precisely describe phenomena of interest. The development of terminology is a sign of a science maturity: concepts must be clearly defined, unambiguous within the context of the disci-



pline, and generally accepted among experts in order for effective communication to occur. In this regard, the question may arise whether police science has a specialized terminology or relies exclusively on the terminology of its parent disciplines (such as law and criminology).

Police science employs a significant amount of terminology from other fields – for example, terms from criminal law (such as crime, investigation, and evidence), terms from security studies (security situation, threat, risk), as well as general sociological terms (social control, deviance, and community). However, during the development of police practice and theory, many specific terms have emerged that hold a special meaning within the police context.

Some of the concepts that form the core of the terminology of police science are, for example: police powers (a set of legal powers entrusted to the police, defined explicitly in police laws), the use of proportionate force, the maintenance of public order and peace, criminal processing (the procedure for gathering information and evidence from the moment of discovery of the act until the indictment), operational tactics, police intelligence model, preventive visit, critical infrastructure (in a security context), forensic identification, professional deviation (in terms of police corruption or overstepping of authority), etc. These terms are part of the everyday vocabulary of police professionals. However, they are also defined and explained in textbooks and manuals, which means that they have the status of professional terms.

A good indicator of the development of terminology is the existence of textbooks, dictionaries, and encyclopaedias dedicated to the field of police science. In the 1990s, the *Encyclopaedia of Police Science* (edited by W. G. Bailey) was published in English, which systematized the terms and concepts relevant to policing in several volumes. Since then, the terminology has been further enriched, especially in the areas of new technologies (e.g., cybercrime and digital forensics are now standard terms, while it was not the case before). Additionally, professional journals and conferences in the region frequently present papers that introduce new terms or discuss definitions of existing ones.

In Serbian, the terminology of police science has primarily developed in parallel with the development of the police service and education. Terms such as criminal tactics, situational plan (in terms of operational action planning), record-keeping (in the context of police databases), forensic analytics, etc., are now part of the standard vocabulary. There is an effort to unify terminology through the development of curricula and publications. For example, the University of Criminal Investigation and Police Studies in Belgrade uses textbooks in which each of these terms is precisely defined for students, thus building a common understanding of the terms among future professionals.

Another aspect of terminology is the existence of acronyms and codes within police practice (e.g., “BOLO” – Be on the Lookout, an international signal; or domestic abbreviations such as “KD” for a criminal offence, “MUP” for the Ministry of the Interior, etc.). These abbreviations and jargon are also part of broader police studies because they reflect the specific culture of the profession. The scientific approach seeks to introduce standardization here as well – e.g., by defining standard 10-codes in police radio communications, which initially originated from practice but was later analyzed and rationalized by research for improved communication.

In conclusion, police science has developed a recognisable professional vocabulary over time. It overlaps in part with the terminology of other disciplines (especially law, security, and forensics), but it also has its own peculiarities. The terminology is supported through teaching literature and scientific papers, where authors strive to define each term they use precisely. This means that the third criterion of science is also met – police science speaks “its own language” that enables precise scientific communication. Of course, the development of terminology is an ongoing process, primarily as new phenomena (such as high-tech crime), necessitate the introduction of new terms; this is true of any



existing science. It is essential to have a solid terminological basis that distinguishes this area from general speech and makes it professional.

THEORETICAL SYSTEM

A theoretical system is a set of theories, conceptual frameworks, and models that explain phenomena within the object of study of a science. A developed theoretical system means that the discipline contains not only a bunch of data, but also general principles, laws, and hypotheses that connect and explain those data. In the classical sciences, examples include Newton's laws of motion in physics, the theory of evolution in biology, and theories of personality in psychology, among others. In the domain of police sciences, the question of the theoretical system is fascinating because it is an applied science close to practice. What kinds of theories exist in police science?

Contrary to a perhaps popular belief that policing is more of a practical skill than a theoretical science, a significant body of theoretical knowledge about police and police work has accumulated over the past few decades. Firstly, theories of police organization and action have been developed. One of the most well-known is the community policing theory, which conceptually explains that the police achieve the best results when they work with the community, build trust, and solve problems in the neighbourhood together. This theory, supported by empirical studies, has changed the paradigm of policing in many countries since the 1980s (Palmiotto, 2011). Furthermore, there is the theory of problem-oriented policing, developed by Hermann Goldstein, which posits that the police should proactively identify the root causes of a problem (e.g., why fights frequently occur in a particular location) and address those causes, rather than responding only to individual incidents.

Various criminal theories have also been developed, which fall partly under criminology and partly are used directly in police practice. For example, Wilson and Kelling's *Broken Windows Theory* suggests that visible signs of disorder and petty crime, if left unaddressed, encourage more serious crime. This theoretical framework has directly influenced policing strategies (e.g., the so-called zero-tolerance approach to disorder). Furthermore, the theory of routine activity (Cohen and Felson) explains the emergence of crime through three elements (motivated offender, convenient target, absence of a law enforcement officer), which gives the police a theoretical model for prevention – e.g., increasing the “guardian of order” (police presence) in a particular place reduces the probability of crime (Goldstein, 1979).

In addition to theories that explain crime and police response, there are also theoretical models within police organizations themselves. The bureaucratic and military model of the police (the traditional model of hierarchical organization) versus the decentralized, standard model is discussed in the theory of police organization (Reiner, 2010). Police subculture theory examines the shared values, norms, and patterns of behavior among police officers and how these affect their perception of work and the public (e.g., “us vs. them” mentality) (Kesić & Zekavica, 2019). The theory of legitimacy and procedural justice (Tyler, 1990) introduces the concept that the way police treat citizens affects the perception of the government's legitimacy and the willingness of citizens to cooperate, which has become an important theoretical basis for training police officers in communication and respect for citizens.

Within the framework of police science, theoretical concepts are sometimes formulated through the modelling of specific processes. For example, models that describe the escalation of violence in conflicts are emerging – when and how a police officer should apply a higher level of force; decision-making models in emergencies; profiling models (based on theoretical assumptions about the relationships between personality and behavior patterns of criminals, as well as the mean distance from the



place of living or work to the place where the crime was committed). Such models, although applied, are based on theoretical assumptions that can be tested.

Police sciences must not exist in a theoretical vacuum – they rely on theories of parent disciplines (criminological theories on the aetiology and phenomenology of manifestations of crime, sociological theories of deviance, psychological theories of aggression, etc.). However, they provide them with a special context of application and often develop sub-theories tailored to the police domain. For example, while criminology generally examines the causes of crime, police science focuses on theories of crime control – that is, not what causes crime (which is more a matter of criminology), but how to effectively suppress and control it (a specific issue of interest to the police). In this sense, it can be said that police science represents an applied theoretical synthesis of various fields, directed towards the practical goal of maintaining order and security.

Some authors refer to police sciences as “applied science”, implying that they do not deal with “pure theory” for its own sake, but rather that the theoretical system exists in service of practical problems (Milojević & Janković, 2022). However, even as applied science, they have theories – only these theories are often immediately associated with the possibility of implementation. Nagel and Vera (2020) define police science as the scientific study of the police as an institution and policing as a process, which, as an applied discipline, combines methods and subjects from related fields. This definition presupposes that these studies reveal general principles, i.e., theoretical outcomes.

It should be noted that specific segments of police science are at different degrees of theoretical development. Some fields, such as forensic sciences, have a significantly developed theoretical apparatus (chemical theories of reactions, genetic theories in DNA analysis, mathematical models of ballistics, etc.). Others, such as operational tactics, rely more on practices and experiential “strategems”; however, theoretical generalizations are also introduced here (e.g., situational awareness tactics – a theoretical framework for how a police officer perceives and reacts to threats in the environment). Over time, as empirical data are collected, these segments also acquire more and more theoretical features (Milojević & Janković, 2022).

We can conclude that police science has a theoretical system built upon a series of partial theories and models, either taken and adapted from other sciences or developed initially through research specific to the police sector. This theoretical system, although perhaps heterogeneous, provides a conceptual framework for understanding the phenomena with which the police deal. Therefore, the condition of the existence of a theoretical basis is fulfilled – police disciplines are not a mere collection of empirical recipes, but also possess abstract knowledge, principles and laws that can be taught, critically considered, and further developed by scientific work.

EMPIRICAL BASIS

The empirical basis of science refers to the fact that its claims and theories rely on factual, observed data and research results, rather than just speculation or dogma. Scientific knowledge must be tested through experience, which can be achieved through experiments, observations, case studies, statistical analyses, or other forms of research. For police science, this means that the effectiveness of methods and the veracity of theories about crime and policing should be confirmed by actual data from practice or research.

In the previous section on methodology, it has already been suggested that police science attaches increasing importance to empirical studies. Today, there is an abundance of data collected by the police (official crime statistics, records of interventions, survey data on the perception of security, video



recordings of cameras, etc.), which scientific methods can analyze. Researchers at universities and institutes are also conducting independent research on various aspects of policing.

For example, numerous studies worldwide have investigated the impact of various policing strategies on crime rates and public trust. An example of an empirical basis is the evaluation of the “Hot Spots Policing” program. The research has repeatedly shown (including systematic reviews in recent years) that focusing police patrols on small geographic areas with high crime rates leads to a measurable reduction in incidents in those areas, without significant spillovers of crime into neighbourhoods (Braga & Weisburd, 2010). These conclusions did not arise by accident – they were derived from carefully designed field experiments and quasi-experiments, which means that practical police tactics have received empirical confirmation.

Furthermore, crime prevention programs, such as DARE (Drug Abuse Resistance Education) or various forms of community policing, have also been evaluated through empirical studies. Some have shown less success, which is also a valuable finding – scientific knowledge of what does not work allows the police to abandon ineffective practices. An example of this is the introduction of mandatory counselling interviews with petty offenders: studies have shown that this has no significant effect on crime recovery rates, and some police have redirected resources to more effective measures (Banton, 1964).

Empirical research in police science is not limited to quantitative measurements. There are also qualitative studies – e.g., in-depth research of cases of corruption in the police through interviews and analysis of documents, which provide insight into the causes and ways of preventing and combating this phenomenon. Studies of community perception through focus groups have contributed to understanding how different communities perceive the police and what influences their willingness to cooperate or report crimes. All of these are empirically collected data (from participants’ experiences or through observation), which are then incorporated into the knowledge of police science (Bittner, 1970).

In Serbia and the region, there is also a particular tradition of empirical research in the police sector. For example, the Faculty of Security in Belgrade and the University of Criminal Investigation and Police Studies have conducted surveys among police officers over the years to assess their training needs, as well as among citizens to gauge their sense of security. The results of these studies were used to adapt training curricula and strategies for fieldwork (Kešetović, Banović, & Radović, 2017). The research conducted by Kešetović et al. (2017) in the context of police education in the face of new challenges involved collecting data on new security threats and analyzing how existing training programs address them, thereby providing an empirical basis for training improvement proposals.

Furthermore, an example of the evaluation of the use of body cameras in the police can be mentioned, which is relatively new: in some police departments, experiments have been conducted where some patrols are equipped with cameras, and some are not, to examine whether this affects the reduction of citizens’ complaints and the reduction of the use of police force. The results of such studies (some published in 2018–2020) are mixed, but they are valuable as an empirical contribution to understanding the effects of technology on policing (Milidragović & Milić, 2024).

All of the above shows that police science is deeply grounded in empiricism. There is an abundant and growing corpus of data and research findings that support (or disprove) theories and methods in policing. This corpus is integrated into teaching and theory – for example, when students are taught about a tactic, case studies and statistics on its effectiveness are often cited. This is the essence of the scientific approach: claims such as “this method is the best” must be supported by evidence, not just tradition. Globally, the trend of “evidence-based policing” promotes precisely the culture of evidence-based decision-making within police organizations (Lum, Koper & Telep, 2011; Braga & Tucker, 2019; Pisa & Welsh, 2022).



With all this in mind, it can be affirmed that there is an inherent empirical component to police science. They do not survive solely on theoretical assumptions; instead, they continually rely on practical indicators from real-world experiences and research to build and refine their knowledge. This also fulfils the criterion of science – the existence of a strong connection with empiricism, which allows verification to confirm or falsify claims, just as in other scientific disciplines.

LOGICAL STRUCTURE

The logical structure of science is understood as the internal organization of knowledge within that discipline – how the concepts are related, whether there is a hierarchy of principles, whether the conclusions drawn are logically consistent with the premises, how the subdisciplines are classified, and so on. The logical structure of a science is often reflected in its systematization: division into branches, fields and disciplines, which are logically related and non-contradictory. Thus, for example, medicine has a logical structure, divided into anatomy, physiology, pathology, clinical medicine, and so on, where each branch has its place and all together form a coherent whole.

When discussing police science, it is worth noting that it is also internally divided into specific areas and disciplines, thereby forming a structured body of knowledge. One of the earlier approaches (Milošević & Mudrić, 2001) proposed that police sciences be divided into systemic (basic), special, and applied disciplines according to their general subject and mode of study. Systemic or basic would refer to the general principles of the police system (e.g., police management, theory of police organization); special to certain areas of police activity (e.g., traffic, counter-narcotics, public order); applied to multidisciplinary fields that link police knowledge with other scientific fields (e.g., forensics, which links police and natural sciences, or security policy, which links police and political science). Such a division points to a logical framework: there is a clear distinction between general theoretical knowledge (basic), concrete practical fields (special) and integrative approaches (applied).

More contemporary considerations of the structure of police science (Milojević & Janković, 2022) also propose a systematization of the discipline. Milojević and Janković contributed to the definition of the structure of police science, outlining a set of disciplines and their interrelationships. The essence is to identify the main areas (broader units of knowledge) from which narrower subjects or subjects of study are then branched out. For example, “Police Traffic Safety” can be listed as the central area, within which there are narrower subjects, such as traffic control and regulation, traffic accident investigations, and traffic prevention. Similarly, the main field of “Criminology” may include criminal investigations, tactics, methods, operations, techniques, and analytics, as well as crime prevention, crime mapping, criminal profiling, criminal strategy, criminal psychology, and criminal victimology, among others.

Each discipline must have well-defined boundaries and clear connections with other disciplines in order to prevent overlap and confusion. In police science, this concept is still being refined, but its tendencies are clear. Banović and Amanović (2022) note that the constitution of police sciences as a distinct scientific field and their integration into the education system facilitate a clear demarcation of which science studies which police phenomena and which sciences form the basis of a particular profile. In other words, if we were to form a formal structure, we would know, for example, that *forensics* belongs to the natural-technical basis of police science. In contrast, *police psychology* has a foothold in the social sciences – but both are part of an integrated system of police science. This establishes a logical schedule that clarifies the discipline and makes it easier to understand.

The internal logic of police science is also reflected in the fact that there is a vertical connection between general principles and specific applications (Milošević & Milojević, 2000). For example, the



general principle “the police act in accordance with the law and ethics” logically underpins all sub-disciplines – from training (where ethics is taught) to practical procedures (where rules on the use of force reflect ethical and legal principles). If a subdiscipline were to argue for the opposite (e.g., that it is permissible to break the law for a higher purpose), there would be a logical inconsistency within the science itself. Fortunately, police science avoids such contradictions because it is based on a unique value framework.

Additionally, logical consistency is reflected in the fact that new theories and models proposed must be in accordance with already proven knowledge or clearly indicate how they enhance or modify it. For example, suppose a new model of patrol organization emerges. In that case, it must take into account pre-existing knowledge about the effects of patrols (empirical basis) and theoretical framework (e.g., routine activity theory) in order to be accepted. Otherwise, it would remain isolated and disconnected, which is rarely accepted by the scientific community. Currently, there are integration trends in police science – for example, linking community policing theories and counterterrorism strategies into a single model of how local policing can contribute to terrorism prevention, which presents a logical challenge (two seemingly different areas are merged). However, theoretical models are adapting and finding common denominators (e.g., building trust in the community as a means of preventing radicalization) (Perry et al., 2013).

A reflection of the logical structure is also presented in the curriculum of police education. Let us look into the curricula at higher education institutions for police education. We can see that the subjects are arranged in a logical sequence: first the basic concepts are taught (e.g., Introduction to Security, Basics of Criminology), then there are general theoretical subjects (Criminology, Penology, and Police Management), then specialist subjects (Methodology of Investigation of Certain Criminal Offences, Traffic Education, Public Order), and finally practical skills and applications (Practice, exercises, and scenarios). This arrangement is not accidental – it reflects how knowledge is structured from the general to the specific and from the theoretical to the applied. If the curriculum is well-designed, students make progress through the building blocks of the discipline and gain a holistic understanding. This is precisely one of the goals of formalizing police science – to systematize and logically organize its content, which is a prerequisite for the quality transfer of knowledge (Milošević & Subošić, 2010).

We can say, therefore, that the police sciences build their logical structure through the definition of narrow disciplines and their mutual relations, through the articulation of general principles that permeate the entire field, and through the organization of the educational process. While this structure may still be in the evolution phase (which is natural for a relatively young academic field), its outlines are clear and consistent. This also fulfils the criterion of logical order – knowledge within police science is not chaotic or contradictory. However, it can be presented as an ordered whole with substructures that together form a coherent system.

VALUE SYSTEM

Science does not exist in a vacuum of value neutrality – especially when it comes to the social sciences and practically applied disciplines. The value system of a discipline refers to the set of ethical principles and values that that discipline implies or promotes. For example, in medicine, the value of preserving life and “not harm” (the Hippocratic Oath) is embedded. In the legal sciences, values are justice and legality. In police science, due to the nature of police work, the value component is essential. Policing is empowered to use force and restrict the rights of individuals for the sake of the common good, which is inherently sensitive and must be guided by strong ethical principles.



Police ethics is the study of the moral aspects of policing. Namely, social goals, by recommending specific values and setting appropriate norms, are seen as influencing relevant behaviors that, through their adaptation, contribute to the integration of the police into society. Police ethics contribute to enhancing the capabilities of police officers by complementing their awareness of the close relationship between professional service and morality, that is, engagement that maximally aligns their service with the purpose of its humanistic and democratic-emancipatory mission. Therefore, police ethics must define codes of conduct for police officers, addressing the dilemmas they face (e.g., conflict of loyalty and legality, use of discretionary decision-making, treatment of vulnerable groups, and suppression of corruption within their own ranks). The existence and development of police ethics is a clear indication that police science has a built-in value system. This system is based primarily on the values of the rule of law, protection of human rights and freedoms, integrity, impartiality and service to the community. As stated by Loftus (2010), an integral part of police science also encompasses topics such as ethics, respect for human rights and freedoms, and the methodology for investigating these aspects. This means that ethical issues are not only a practical code, but also the subject of scientific research within the field (through sociological and psychological studies of professional ethics, case studies, etc.).

Historically, the development of modern police forces has also established ethical standards – from the Peel Principles of Policing of 1829 (which defined that the primary mission of the police is to prevent and combat crime and maintain order with public cooperation, that the police must have public trust, that the use of force comes as a last resort, etc.), to modern international documents such as the United Nations Code of Conduct for Law Enforcement Officers (1979), which globally prescribes basic ethical norms (legality, proportionality, humanity). All these values are integrated into the teaching at police academies, forming a pillar of police professionalization.

Police science, as an academic field, promotes these values through research and education. One of the goals defined in the literature is for the scientific education of police officers to lead to a higher level of professional awareness and ethics (Crank, 2007). For example, the study of human rights violations during police interventions (which would be among the adverse outcomes) leads to the development of training to prevent this, which is a direct combination of a value system and scientific knowledge. Likewise, studies of the police subculture that have revealed phenomena such as the “blue wall of silence” (the tendency of police officers to protect their colleagues even when they make mistakes) have a value implication: they have pointed to the need to suppress this phenomenon through ethical training and a system of accountability in favor of the values of responsibility and honesty (Westmarland, 2005).

The very fact that Police Ethics is taught as a subject, often compulsory, at police higher education institutions, confirms that the value system is not secondary, but central. In the literature in this field, principles such as legality (always acting in accordance with the law), neutrality (impartiality), proportionality, regularity, gradualness, responsibility, respect for the dignity of all persons, honor, and loyalty to the service and public interest, as well as courage and restraint, are emphasized. Police science also explores dilemmas when these values clash – for example, how much privacy can be sacrificed for the sake of security? How much force is morally justified to use against a violent offender? Such questions cannot be solved by empiricism or theory alone, but involve philosophical and ethical analysis, which is what police science does.

Thus, unlike the natural sciences, which strive for value neutrality, police science openly integrates a value system because its goal is for the police as a social institution to act morally upright. Such a normative aspect does not diminish the scientific nature of the discipline. However, it is a necessary part of its identity – much like medicine has the normative aspect of “saving lives”, despite being a scientific field. The value system must be clearly articulated, discussed and improved within the field itself, which is the case. There are international and national conferences dedicated to police ethics, featuring papers



that analyze cases of ethics violations and propose solutions, as well as comparative studies that assess police integrity in different countries. All this falls within the framework of police science, showing that values are not taken for granted but are subject to critical examination and standardization.

Therefore, police sciences also meet this criterion of science – they have their own value system that is embedded in their theory and practice. This system is aligned with broader social values (legality, human rights) and seeks to improve the police profession. In scientific papers in the field of policing, the importance of ethics and values is often explicitly stated (we can see this through the keywords of many articles – e.g., “police integrity”, “ethical policing” are frequent topics). In this way, police science contributes to ensuring that police work is not only practical but also legitimate and moral, thus serving the common good.

INSTITUTIONAL FRAMEWORK

For a field of knowledge to truly function as a science, it also requires an adequate institutional framework. This means that there must be institutions that support this science, such as universities, colleges, research institutes, professional associations, research funds, scientific journals, and conferences where the results are published. The institutional framework ensures the continuity of research, the training of new scientists and practitioners, the exchange of ideas and the general development of the discipline.

Police science has long been nurtured within institutions that may not have been formally recognized as “scientific institutions”, such as police academies or internal research departments of interior ministries. However, globally, there is a pervasive network of institutions dedicated to police science today. There are over 500 police colleges and universities in the world where police studies are carried out (typically a Bachelor of Science in Police Studies or equivalent). There are also several independent Universities of Applied Police Sciences – examples include the University of Criminal Investigation and Police Studies in Belgrade, the University of Applied Sciences for Police and Public Administration in the German state of North Rhine-Westphalia, and others. These data clearly illustrate that the police, once exclusively vocational training, have also become an academic discipline in the higher education system.

Across Europe and the world, police training centres have been transformed to or integrated into university frameworks. For example, the United Kingdom and Australia have university courses and research centres dedicated to police studies. In the United States, several criminology departments incorporate policing topics into their programs and research. The FBI also maintains its own National Academy Centre, and many law enforcement agencies and services collaborate closely with civilian universities. In the region, the former Police Academy in Belgrade has grown through reforms into the University of Criminal Investigation and Police Studies (KPU) – which represents the formal recognition of police studies as a higher educational, academic program (KPU has accredited bachelor’s, master’s and doctoral studies in the fields of criminal and police sciences, forensics and informatics and computer science). Thus, a domestic institutional framework for the development of police science in Serbia was created. Similarly, in Croatia, there is a Police College (incorporated within the Ministry of the Interior, but with a tendency towards a higher education status). In Bosnia and Herzegovina, faculties for security and criminology have been established (e.g., the Faculty of Criminology, Security Studies, and Law in Sarajevo). These are all institutions where police science is taught and developed.

In addition to educational institutions, an important part of the institutional framework embodies research institutes and projects. In Serbia, the Institute for Criminological and Sociological Research also includes projects related to police and security, collaborating with the KPU and the Ministry of



the Interior. At the EU level, there is CEPOL (EU Agency for Law Enforcement Training), which, in addition to coordinating training, encourages scientific research cooperation between the police institutions of the member states (conferences are held, standard teaching bases are developed, etc.). Furthermore, international organisations such as the UN, OSCE, and INTERPOL have departments that generate surveys and manuals relevant to police work (e.g., analyses of best practices in the police, statistical reports on crime trends). All this relies on a scientific approach and involves experts from the academic community.

Scientific journals and conferences specific to police science represent another pillar of the institutional framework. Several international journals are dedicated exclusively to police studies, including *Police Practice and Research*, *Policing*, an international journal, and *The International Journal of Police Science & Management*. These journals have a peer-review process and publish the results of contemporary research from all subdisciplines – from patrol strategies to police psychology. At the regional level, the journal *Science, Security, Police* (published by KPU) and, for example, the *Review of Criminology and Criminal Law* regularly publish papers on police topics. There are also frequent conferences and scientific conferences, such as the traditional international conference “Archibald Reiss Days”, which brings together scientists and police practitioners from Serbia and abroad to exchange knowledge. The presence of such activities indicates a vibrant scientific community that specializes in police science. This community has also been formalized through associations – e.g., the International Association of Chiefs of Police has a research wing that brings together researchers and practitioners. Additionally, there are academic associations, such as the European Society of Criminology Working Group on Policing.

Regardless of all said above, the specific situation in Serbia should be mentioned again: police sciences are not yet formally recognized as a separate scientific field in the classification sense (they are mostly de facto within the social sciences and humanities, but not de jure as a separate category) (Milojević et al., 2025a; Milojević et al., 2025b). However, this does not mean that there is a lack of an institutional framework – it exists and functions (KPU, etc.) - but rather as an imminent administrative step that would give it complete legitimacy. The authors Banović and Amanović (2022) and Milojević et al. (2025) argue that the establishment of police sciences as a separate scientific field is a necessary prerequisite for its equal treatment with other sciences. In other words, an official institutionalization at the level of scientific policy is proposed.² This is an inevitable next step and it is demonstrated by the increasing participation of police experts in scientific committees, accreditation bodies for study programs, and other relevant organizations.

Overall, the institutional framework of police science has mainly been established, with schools, universities, research programs, journals, and conferences dedicated to this field. This enables the continuous development of knowledge and its dissemination, which fulfils another criterion of science – that there is support and structure that enables systematic dealing with this science. Without institutions, science could not progress; police science has clearly found its place within institutions, even if, administratively, there is still a struggle for the status.

² Namely, in September 2024, the KPU submitted a reasoned proposal to the Main Committee for Philosophy, Psychology, Pedagogy and Sociology, to classify police sciences as a branch of Social Sciences, which it considered, and submitted a positive decision to the National Council for Science and Technological Development of the Republic of Serbia, which in the same year initiated an amendment to the legislation governing the division of sciences into fields, branches and disciplines.



SOCIAL CONTEXT

Science is always placed in a particular social context that influences its priorities, development and application. For applied sciences such as policing, the social context is of immediate importance, because security problems, criminality and society's expectations of the police depend on time and environment. The social context of police science encompasses both the reasons for its creation and the needs it addresses, as well as the impact of social change on the direction of research development.

Historically, the development of police science has been largely a response to societal changes evolving security challenges. We are living in a time of unprecedented expansion of science and the information age, which opens up new opportunities for security threats (Ferguson, 2017). The emergence of global terrorism, high-tech crime, transnational organized crime groups, migration waves, and changed public attitudes towards the police (demands for greater responsibility, protection of human rights) are social factors that impose the need for a scientific approach in the police. Police science has evolved precisely to answer the questions: how to proactively respond to terrorism, serious and organized crime, while preserving freedoms? How to use digital evidence from the seizure of computers? How can we reorganize the police to be more effective and efficient in a democratic society? Thus, the social context is also the driving force behind the development of police science.

For example, the rise of "community policing" theories in the US in the 1980s can be seen in the context of the broken relationship between the police and communities (predominantly minority communities) and society's need to fix it. Subsequently, sociologists and criminologists, along with practitioners, developed a new philosophy of work, which was afterwards scientifically tested and refined. Similarly, the decline in trust in the police following specific incidents (e.g., excessive use of force) in society has initiated research into procedural justice and conflict de-escalation training. Modern trends such as the Black Lives Matter movement around the world have led to an increased academic interest in the study of bias in policing (racial, ethnic profiling) and the development of science-based training programs to prevent and combat these biases. In other words, social problems become research problems of police science.

The social context also determines the role and place of police science in society. In democratic societies, police science is encouraged to develop because there is a demand for a more professional, effective, efficient and transparent police force – and this can only be achieved by relying on knowledge and training, rather than force and authority per se. On the other hand, in authoritarian contexts, there may not have been a strong incentive for science; instead, the police relied on their power. That is why we see that the boom in police studies often correlates with democratic transitions and security sector reforms. During the 2000s, police reforms and integration into international trends also contributed to the development of police-related faculties and studies in the Balkans. The impact of the Bologna Process on police education in Europe is noticeable – the standardization of higher education has also had an influence on police academies, introducing them into academic frameworks. Amanović et al. (2017) point to these reform processes.

The social context also includes the public perception of science and the police to the extent that the public and decision-makers recognize the value of a scientific approach in policing, thus leading to more investment and interest in research. In this sense, we can say that today, in the era of information, it is easier than ever to explain why it is important, for example, to statistically monitor crime and evaluate the work of the police, because society expects an "evidence-based" approach in other areas (such as medicine or education). Thus, it is increasingly accepted among police officers that "hunch" and traditional methods should be subjected to data verification, and this is becoming part of the culture. The role of scientists in law enforcement is becoming increasingly legitimate and in demand – a shift



that was not always the case. Milojević et al. (2025a, 2025b) emphasize the importance of integrating knowledge developed in practice and science for more efficient application in police education and everyday affairs. It is essentially a call to build a bridge between theory and practice more effectively, which occurs when society (including police, citizens, and the state) desires it.

Undeniably, the social context can also be challenging - rapid social change means that police science needs to evolve dynamically. What was topical yesterday (e.g., the fight against classic forms of crime) is now complemented by new topics (cybercrime, pandemics and maintaining public order, climate change and migration, etc.). One of the values that police science brings is anticipation and proactive action – through scenarios and analyses of crime hotspots, they help society prepare for future threats. Thus, the concept of applying the “scanning horizon” method, which security experts and analysts use to assess future security risks and develop effective strategies to respond to them, draws on and utilizes the scientific contributions of police science (Ferguson, 2017).

In summary, police science is deeply rooted in the social context and serves society's needs for security and justice. They were created and evolved precisely in response to societal challenges and will continue to do so. With this, another criterion has been fulfilled – connection with society. There is no confinement in the “ivory tower”. On the contrary, every finding of police science has potentially immediate application and repercussions in the community. The social context is not just a background, but an integral part of the police sciences – they are, as a science of public safety, inherently a “social science” and their success is also measured by the positive changes in society that they can bring about, which makes them very relevant and necessary.

EDUCATIONAL FUNCTION

Last, but not least, the constituent of science that we are considering is the educational function. Scientific knowledge has value not only in discovering new facts, but also in passing this knowledge on to new generations – educating personnel who will utilize and further develop it. For police science, the educational function is crucial because it is an applied science that should directly improve police work through the training of its members, as well as educate experts who will continue research.

Today, hundreds of higher education institutions worldwide educate students in the field of police science. This means that police science has an established curriculum, which is a key aspect of its educational function. Undergraduate programs typically combine theoretical lectures (e.g., on sociology, criminology, police ethics, police organization, and criminal law) with more applied lectures from the corpus of criminal disciplines, as well as practical training (self-defence skills, shooting, and incident simulation exercises). Such a combination is possible precisely because there is a scientific basis for each topic – it is no longer enough to “train” a police officer only practically, but also to educate him to understand the bigger picture and principles. In Europe, for example, the Bologna Process has prompted police schools to incorporate more theoretical subjects and research components into their curricula (Amanović et al., 2017).

In Serbia, with the transformation of the Police Academy into the KPU, master's and doctoral studies in police science were introduced. This means that not only are future police officers now being educated for basic duties, but also future scientists and lecturers in this field. Doctoral dissertations defended at the KPU and related institutions address topics such as forensic identification, the improvement of investigative methodology, and the analysis of crime in the community – all of which are original scientific papers that further contribute to the body of knowledge. The educational role thus



shifts from merely transferring existing knowledge to creating a new generation of researchers who will disseminate and advance knowledge.

On a more practical level, the educational function of police science is also reflected in the provision of continuous training, including professional development and advanced training programs, for active police officers. Scientific institutions often collaborate with police agencies in developing programs for what is known as continuing professional development. For instance, after the adoption of new laws or technological solutions, the teaching staff of police studies organizes seminars and courses for officers to transfer the necessary knowledge to them. Such was the case with the introduction of information systems in the police – experts from the Faculty of Organizational Sciences and KPU jointly trained police officers to work with new databases, combining IT knowledge with an understanding of police procedures.

The educational function is also a test of scientific maturity. If a piece of knowledge cannot be taught effectively, it suggests that it is not well-organized or systematized. Police science, through decades of teaching, has successfully codified its material, allowing it to be transmitted effectively. There are textbooks for almost all areas – from basic (e.g., “Police Law”, “Criminalistic Tactics”) to advanced and specialist (“Police Topography”, “Police Management”). These textbooks synthesize the results of scientific research into a form suitable for teaching, which shows the maturity of the field.

An indicator of the value of the educational function is that graduates of police studies possess competencies that enhance the overall ability of police organizations. Empirical research suggests that police officers with a college degree have fewer complaints about their work, are less likely to resort to force unnecessarily, and are more effective at handling complex situations, compared to those with a lower level of education. This is also a compelling argument in favor of police science as a central place in the education of personnel – the knowledge they impart directly influences the quality of police work to great extent and, consequently, the security and justice in society.

Another aspect is specialist training for specific functions (e.g., training police officers to work on cases of domestic violence). Moreover, this is where the scientific approach is reflected – the content of these trainings is based on studies and expert recommendations. For example, if research shows that a specific interrogation protocol is better for victims of violence, that finding becomes part of the training. Thus, scientifically generated knowledge enters educational programs, and then, through trained personnel, again have influence on practice.

Police science, through its educational role, also contributes to the popularization of the scientific view of police work among police officers themselves. As generations of police officers are educated within academies and universities, so is the culture – there is a growing willingness to embrace innovation, critically examine practice, and improve according to the research results. This closes the circle: science-based education produces practitioners who value science and often initiate new research questions, which in turn further advances the development of police science.

In short, police sciences fully fulfil their educational function: they have become an integral part of the formal education of police personnel at various levels, have developed teaching materials and methodologies, and, through education, influence the improvement of the police service itself. This completes the last of the defined constituents of the scientific basis – police science does not exist only “in books”, but lives through educational institutions and through people who are educated in that system and carry this knowledge into their professional lives.



SIGNIFICANCE OF THE FINDINGS: THEORETICAL, METHODOLOGICAL AND INSTITUTIONAL IMPLICATIONS

Through the previous analysis, we have determined that the scientific disciplines of police sciences meet all ten criteria considered essential for science: they have a defined subject, methodology, terminology, theoretical system, empirical basis, logical structure, value system, institutional framework, social context, and educational function. Taken together, these findings point to a clear conclusion – police science is a science-based discipline, not merely a collection of practical skills. In this section, we will discuss the implications of this conclusion, address some possible counterarguments or misconceptions, and examine the current status and future development of police science.

1. Previous debates - “skill versus science”: Traditionally, there has been resistance to the idea that policing requires academic knowledge; it was thought to be a craft best learned through experience on the street and through hierarchical mentorship. Such a perception is similar to the old notion that, for example, medicine was more of an “art of healing” before it became based on science. A discussion of our results clearly shows that a similar shift has occurred in the case of the police – from relying on routine and intuition to an approach based on data, theory and proven methods. Policing will always involve an element of acting skills, as it requires leadership skills, interpersonal communication, and split second decision-making, among others. However, all of these skills can now be improved and refined through scientific knowledge. Therefore, it is not a question of whether the police are “just a skill or a science”, but that science provides the foundation on which skills are built more effectively. Through formal education, new generations of police officers learn not only what to do, but also why – understanding the basis of their actions through scientific principles, which ultimately professionalizes the service.
2. Equal treatment within the scientific system: If we accept (and the evidence supports) that police sciences have all the constituents of science, the question arises of their formal integration into the system of sciences. In Serbia, as Banović and Amanović (2022) note, the absence of police science in the official nomenclature of scientific fields is an anachronism. In practice, this can mean difficult funding for specific research, the absence of adequate committees for title selection, and so on, the discussion of the results suggests that the official recognition of police sciences (e.g., the formation of a separate scientific field, i.e., a branch within the social sciences and humanities) as proposed to the National Council by the Parent Committee (on the initiative of the KPU), would be justified. This would create an institutional framework for the area to gain more support and visibility. Such a step no longer requires further persuasion from the wider academic community, as the arguments are already compelling - if legal sciences or military sciences have their place, there is no reason why police science should not exist, especially given its interdisciplinary and socially beneficial character.
3. Attitude towards related disciplines: Police sciences are interdisciplinary in nature, so the question sometimes arises whether they are just “applied criminology” or “applied security study”. A discussion of our findings, the object of study, and the theoretical system reveals that police science has a specific focus – it is centred on the institution and the process of policing. They indeed share a lot with criminology (which studies the aetiology and phenomenology of crime and offenders), law (which provides rules of action), sociology (which examines the relationship between community and control), and other related fields. However, this multidisciplinary “background” does not negate the identity of police science, just as e.g., the engineering sciences share a background in mathematics and physics, but are nevertheless separate because of their specific focus on application. We can say that police science connects the theory and practice of various disciplines in a single context – the context of preserving public order and legality. This



argument is also important for positioning in the academic community - the goal is not to oppose police science to criminology or security studies, but to have complementary relationships. Moreover, cooperation is necessary – and in practice, we see that researchers often publish in criminological and police journals simultaneously, allowing students to gain a combined knowledge. Formal recognition of police science does not undermine these relations, but can deepen them, because it allows for a more precise identification of what is whose domain.

4. Advancing practice through science: One of the important elements of the discussion is how the validated science of police disciplines benefits the police themselves and citizens. From the results, we see numerous examples – ranging from improved methods to ethical standards. This implies that leaders of police organizations and policymakers should rely on the findings of police science to inform their decisions. For example, if empirical evidence says that a particular training model significantly reduces citizen complaints, this should be applied systematically. If theory and research suggest allocating patrols for more effective coverage, this should not be ignored. Unfortunately, there is still a gap in practice – sometimes innovations remain at the level of pilot projects or scientific papers, and do not come to life in the entire organization. The discussion leads to a recommendation: the “science–practice” link needs to be strengthened. That means more embedded models, more joint teams of scientists and police officers, regular monitoring and adaptation of procedures based on research. Fortunately, trends (especially in Anglo-Saxon countries) are moving in this direction – the so-called “evidence-based policing networks” (e.g., EPB in the UK, the Centre for Evidence-Based Crime Policy in the US) disseminate these connections. In the region, this has yet to reach full momentum, and it is here that the educational function plays a crucial role – new graduates of police science are often the ones who “bring the spirit of science” to their units.
5. Challenges and future directions: Although we have established a scientific basis, it does not mean that police science is fully built or that there is no room for improvement. The first challenge is the rapid pace of technological change – science must continually keep pace with phenomena such as artificial intelligence in policing, big data crime analysis, and cryptocurrencies in criminal transactions, among others. This will require even greater integration with the natural and technical sciences (e.g., cooperation with the IT sector). The second challenge is the globalization of security threats, which also requires the globalization of scientific solutions. Networking of police scientific institutions will become increasingly important (comparative studies between countries are already being done, which is welcome). The third challenge is ethics and legitimacy: in the era of surveillance and potential privacy invasions, police science must be at the forefront of finding a balance between security and freedom – a task that is both theoretical and practical. These are all fields for future research and theory development.

An interesting direction is the academic independence of police sciences – e.g., the development of one’s own theoretical models that do not originate solely from adaptation in criminology or sociology, but emerge from police data. As the database and research expand, it is more likely that indigenous theories will emerge (some of which we already have, such as the “police integrity” theory developed by Kutnjak Ivković et al., or the “police demand management” theory) (Kutnjak Ivković, 2003). This will further determine the status of police science.

6. Wider social significance of recognizing police science: At the end of the discussion, it should be emphasized that treating police disciplines as a science also has a symbolic significance: it raises the reputation of the police profession, attracts better quality personnel (because it becomes clear that it is not only a “physical job” but also an intellectual endeavor), increases public trust (which sees that the police are investing in knowledge and modernization). As an analogy, let



us think of the period when teachers or nurses received a university education – the profession gained in status and quality. Similarly, by adopting a scientific basis, the police enhance their professionalization and, consequently, their legitimacy.

Thus, the results of this work are not only of theoretical significance but also have practical and strategic implications. The main argument – that police sciences possess all the constitutive elements of science – is that there is no justification for marginalizing it in academia. On the contrary, they should be a central part of both security studies and broader interdisciplinary cooperation, because their specific focus fills an important niche between theoretical knowledge and practical security.

CONCLUSION

Starting from the defined criteria of science and their application to police science, this paper has shown that the scientific disciplines of police sciences have a solid scientific foundation. By analysing through ten aspects – subject, methodology, terminology, theoretical system, empirical basis, logical structure, value system, institutional framework, social context and educational function – we have established that police sciences meet each of these conditions on an equal footing with other established sciences.

The object of study of police sciences is clearly defined (police, crime and related phenomena), which ensures the focus and social relevance of their research. Diverse and rigorous scientific methods are used, and the discipline has developed its own specific methodological approaches, confirming that the methodology of police science is truly scientific. Over time, a recognizable professional glossary, i.e., terminology, has been established, which facilitates precise communication and the further development of knowledge. An extensive and diverse theoretical system has been developed, encompassing theories on policing, crime prevention models, community relations, and other related areas, making police science a theoretically grounded field rather than just a collection of empirical guidelines. All of these theories and claims are supported by empirical evidence from numerous studies, both experimental and observational, which provides a solid basis for the validity of knowledge. The internal logical structure of the discipline is reflected in its systematization into subdisciplines and the consistency of principles applied throughout the system. The value system of police science, through police ethics and related principles, provides a normative compass and promotes compliance with fundamental social values, while also being a subject of critical research within the discipline itself. Furthermore, police sciences have established a strong institutional framework – from universities and schools to journals and associations – that provides organizational support for further progress. Their development and direction largely reflect the social context and needs of society, which makes these sciences extremely relevant and adaptable to change. Finally, they perform a key educational function by educating new generations of police officers and researchers, imparting science-based knowledge to them, and thus closing the circle from theory to practice.

Based on all the above, we can unequivocally conclude that disciplines such as police ethics, police organization and tactics, police-criminal topography, traffic safety (social aspects), and special physical education for the police, among others, constitute scientific knowledge in the complete sense of the word. They possess all the characteristics expected of a science: systematicity, reviewing, objectivity, verifiability, and a developmental dimension. Consequently, they should be practically recognized in academia through further integration into scientific classifications and research funding, and in police practice through even more intensive reliance on the results that these sciences offer.



The presented conclusion has broader implications: strengthening the scientific basis of police work contributes to improving the security of citizens, i.e., more effective, efficient, and responsible work of police institutions. When the police utilize science as an ally, they are equipped with a powerful tool to adapt to modern challenges and expectations. Knowledge-based policing is an ideal to strive for, and police science is precisely the mechanism by which this ideal is realized.

Therefore, the recommendation derived from this paper is to continue and intensify the development of police science, both through theoretical research and through its application in training and practice. Institutional strengthening of this area in countries where it has not yet been done – including Serbia – is significant, as it will lead to a more fruitful connection between academic knowledge and practical action. As pointed out in the paper, in Europe and around the world, police science already occupies an equal place alongside other sciences, and it is time for this to be fully realized in our country.

Ultimately, the scientific basis of police science can no longer be questioned; instead, it should be taken as a starting point and built upon to yield new knowledge and even more professional police practices that benefit society as a whole.

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INVISIBLE HARMS, ELUSIVE JUSTICE: UNMASKING THE EVIDENTIARY AND LEGAL CHALLENGES OF ENVIRONMENTAL CRIME PROSECUTION

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ABSTRACT

Purpose: The paper explores the multifaceted challenges associated with detecting and proving environmental crime in Serbia, set against the backdrop of evolving European standards and good practices. It aims to identify legal, procedural, and institutional weaknesses that hinder effective enforcement. Despite its growing prevalence and severe ecological and societal impact, environmental crime remains chronically under-investigated and under-prosecuted worldwide and in Serbia.

Design/Method/Approach: The paper combines doctrinal legal research with comparative legal methodology. It examines Serbia's case law, legal instruments, prosecutorial practices, and institutional setup in Serbia and compares these with selected European models. Sources include legal instruments, policy documents, interviews with practitioners, and data from enforcement agencies.

Findings: The research reveals persistent weakness in Serbia, including vague definitions of environmental crimes, lack of prosecutorial specialization, poor use of environmental forensics, and limited cross-sector coordination. The low number of indictments and convictions points to an enforcement gap. In contrast, good European practices demonstrate the value of multidisciplinary investigative teams, specialized environmental units with prosecution services, and the use of scientific expertise to establish causality and harm.

Originality/Value: The paper offers a focused, context-specific analysis of Serbia's challenges in prosecuting environmental crime, enriched by comparative insights from the EU. It provides actionable recommendations, including legislative amendments, capacity building for prosecutors and inspectors, and the adoption of mechanisms for joint investigation and expert collaboration.

Keywords: environmental crime, criminal justice, prosecution, forensic evidence, capacity building.

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INTRODUCTION

Environmental crime has emerged as one of the most pressing yet under-addressed forms of criminality in the contemporary era. Activities such as illegal logging, mining, and waste trafficking are no longer marginal issues but constitute a vast and lucrative criminal economy. According to the Financial Action Task Force (FATF), these crimes generate staggering illicit proceeds, estimated between USD 110 and 281 billion annually.² They are often linked to other serious offences, including corruption, tax crimes, and human trafficking, demonstrating their embeddedness within broader networks of organized crime.

Encompassing a wide range of unlawful acts that cause significant harm to the environment, human health, and the rule of law, often with transboundary implications that makes it both a national and international concern. Despite its gravity, environmental crime remains notoriously difficult to prosecute effectively. It is generally a low-risk, high reward crime, enforcement actions lag far behind the scale of the damage and the financial flows involved.³

In Serbia, as in many jurisdictions, it is often treated with low institutional priority, leading to low detection rates, scarce indictments, and even fewer convictions (WWF-Adria Serbia, 2022: 56). Limited prosecutorial specialization, evidentiary hurdles, and systemic weaknesses further exacerbate the enforcement gap. Against this background, this article examines the systemic, legal, and evidentiary obstacles to effective prosecution of environmental offenses in Serbia, situating them within the broader European context and drawing lessons from comparative examples to highlight potential pathways for reform.

THE LEGAL LANDSCAPE: AMBIGUITY AND FRAGMENTATION

Environmental criminal law in Serbia is characterized by a fragmented normative framework. Although the Criminal Code of Serbia (Criminal Code – CC, Official Gazette RS, 85/2005, 88/2005, 107/2005, 72/2009, 111/2009, 121/2012, 104/2013, 108/2014, 94/2016, 35/2019, 94/2024) includes a chapter on criminal offences against the environment (Articles 260–281 CC), many of these provisions are either vaguely worded or lack clear enforcement parameters (Škulić, 2024: 1057). For instance, the offence of “environmental pollution” (Article 260) does not require proof of actual harm but only “endangerment,” which is rarely interpreted consistently by courts. Phrases such as “endangerment,” “considerable damage,” or “violation of regulations” are not sufficiently defined by either statute or jurisprudence, which generates interpretative uncertainty and legal inconsistency.

An additional challenge arises from the proliferation of misdemeanours and commercial offences within Serbia’s environmental legislation (Kostić, 2025: 8). Many acts that could potentially constitute environmental crimes under the Criminal Code are instead prosecuted as misdemeanours, often resulting in relatively minor penalties such as fines, warnings, or short-term operational suspensions. based on the Law on Environmental Protection (Official Gazette RS, 135/2004, 36/2009, 72/2009, 43/2011, 14/2016, 76/2018, 95/2018, 95/2024 – Another Law), the Law on Waters (Official Gazette

² See: <https://www.fatf-gafi.org/content/dam/fatf-gafi/brochures/Money-laundering-from-environmental-crime-handout.pdf>

³ See UNODC and INTERPOL assessment: <https://www.interpol.int/Crimes/Environmental-crime/Pollution-crime> and https://www.unodc.org/unodc/frontpage/2024/April/explainer_-what-are-crimes-that-affect-the-environment.html



RS, 30/2010, 93/2012, 101/2016, 95/2018, and 95/2018 – Another Law), the Law on Waste Management (Official Gazette RS, 36/2009, 88/2010, 14/2016, 95/2018 – Another Law and 35/2023), among others. Similarly, certain forms of environmental harm are addressed under the regime of commercial offenses, where liability is primarily corporate and sanctions are financial.⁴ This overlapping of legal instruments creates enforcement fragmentation, encourages forum shopping, and can undermine the deterrent effect of criminal law. The environmental harms are more often processed as misdemeanours, thereby limiting the deterrent effect of criminal sanctions and marginalizing prosecutorial engagement (Kostić, 2025: 9). Scholars have warned that such a system risks underestimating severe environmental harms and relegating them to the realm of administrative regulation rather than criminal justice (Faure, 2017: 332). This creates what some scholars have termed “normative leakage” (Faure, 2010), whereby conduct that should trigger criminal accountability is diverted to more lenient administrative proceedings.

This complex penal framework often overlaps with criminal law provisions, creating confusion about which enforcement path should be pursued. In practice, many cases that might merit criminal investigation are instead resolved through misdemeanour proceedings, which typically result in minor fines and carry limited deterrent effect.

This situation stands in contrast to evolving European standards (Drenovak-Ivanović et al. 2015: 51). The EU Environmental Crime Directive 2024/1203 requires member states and candidate countries to ensure that environmental crimes are punishable by effective, proportionate, and dissuasive criminal penalties (Stojanović, Bodrožić, 2025: 12).⁵ The growing importance of environmental crime is further confirmed by the fact that it is included in the list of offences subject to EU instruments of mutual recognition, such as the European Arrest Warrant (EAW), and falls within the jurisdiction of Europol and Eurojust (Matić Bošković, 2022a: 60). Serbia, while aligning many sectoral laws with the EU *acquis*, has yet to fully transpose these requirements into the criminal law framework (European Commission, 2024: 17).

Recent reforms, such as the 2024 amendments to the Law on Environmental Impact Assessment and the Law on Strategic Environmental Assessment, have sought to improve coherence and align national procedures with EU expectations (CEE Legal Matters, 2025). However, without parallel criminal law reform and greater prosecutorial capacity, enforcement gaps are likely to persist.

Serbia's environmental criminal law is hindered by substantive vagueness, fragmented enforcement pathways, and an overreliance on misdemeanour sanctions. To close the enforcement gap, reforms must focus on statutory precision, institutional specialization, and a recalibration of the normative hierarchy between misdemeanour and criminal accountability mechanisms.

EVIDENTIARY CHALLENGES: PROVING ENVIRONMENTAL HARM

One of the core obstacles in prosecuting environmental crime lies in the complex task of establishing causality and quantifying harm. Unlike many conventional criminal offences, environmental crimes often manifest through diffuse, cumulative, and long-term processes, making it difficult to directly

4 The catalogue of criminal offences from the secondary criminal legislation in the field of environmental protection can be compiled by analysing the penal provisions of laws relating to environmental protection, as listed on the website of the Ministry of Environmental Protection, available at https://www.ekologija.gov.rs/sites/default/files/inline-files/Spisak_propisa_iz_oblasti_ZZS_-_230217.pdf, as well as by reviewing the penal provisions of other laws that define commercial offences and misdemeanours in the mentioned field but are not included in the Ministry's list.

5 Directive (EU) 2024/1203 of the European Parliament and of the Council of 11 April 2024 on the protection of the environment through criminal law and replacing Directives 2008/99/EC and 2009/123/EC.



link a specific act or omission to a concrete and measurable environmental harm (Faure, 2017: 340). The temporal and spatial dispersal of environmental damage, such as the gradual contamination of watercourses, incremental soil degradation, or long-term biodiversity loss, poses significant challenges. These diffuse and cumulative harms complicate efforts by law enforcement and the judicial system to attribute responsibility to clearly identifiable actors, undermining effective prosecution (Faure & Svatikova, 2012: 256). This stands in sharp contrast to the more immediate and tangible harms associated with traditional offences, where causation is often more straightforward to establish.

From a doctrinal perspective, Serbian criminal procedure requires a high standard of proof, which in environmental cases demands robust and scientifically grounded evidence. In practice, this often necessitates the use of sophisticated environmental forensic techniques, including hydrological and air dispersion modelling, geospatial mapping, isotopic tracing, and ecological risk assessments. These tools are crucial not only for establishing the occurrence and extent of damage but also for demonstrating the causal nexus between the conduct of a suspect and the harm caused (White, 2013).

However, Serbia lacks an institutionalized system for environmental forensic capacity within its prosecutorial and investigative structures. This deficiency manifests in several ways. Prosecutors frequently rely on laboratory analyses conducted by state institutions, however the updated list of accredited laboratories is not easily available. At the same time, prosecutors lack sufficient financial resources to engage private laboratories, which further limits their access to timely and reliable expertise (Kostić, 2025: 33). Independent expert testimony, often indispensable for strengthening prosecutorial cases, is rarely sought due to both budgetary constraints (Matić Bošković & Kostić, 2024: 16) and uncertainty over admissibility. Moreover, existing procedural rules do not sufficiently accommodate the complexity of environmental scientific evidence, resulting in frequent challenges to its validity and reliability during trial.

There is a systemic gap in institutional capacity, since there is no dedicated forensic environmental unit within the prosecution service and no structured training for prosecutors on interpreting and presenting scientific data in court (Kostić, 2025: 13). In many instances, evidence gathering is heavily dependent on environmental inspectors, whose own capacity is uneven and whose reports may not meet the forensic standards necessary for successful prosecution (Matić Bošković, 2022b: 42). The absence of multidisciplinary investigative teams, integrating prosecutors, environmental inspectors, forensic scientists, and technical experts, has resulted in a persistent disconnect between the legal and scientific dimensions of environmental enforcement. Without integrated expertise, environmental law enforcement remains fragmented, with legal processes often failing to fully reflect the technical realities on which effective prosecution depends.

Often, the failure to successfully prosecute environmental crimes frequently arises not from institutional and evidentiary constraints but rather from the absence of unlawful conduct (Uhlmann, 2014). This evidentiary gap is compounded in Serbia by the lack of continuous training for prosecutors on interpreting and presenting scientific data and by limited opportunities for cross-sector cooperation with environmental inspection services, universities, and research institutions.

INSTITUTIONAL WEAKNESSES: LACK OF SPECIALIZATION AND COORDINATION

Comparative experiences from EU member states demonstrate that bridging the enforcement gap requires both structural and procedural reforms. The establishment of specialized environmental prosecution units, staffed with prosecutors trained in environmental law and supported by forensic scientists, has significantly improved enforcement in countries such as the Netherlands (Tak, 2008: 51).



However, Serbia does not have specialized prosecutorial units for environmental crime. Environmental offences are generally handled by public prosecutors with broad jurisdiction, whose primary caseloads are dominated by conventional criminal matters. Consequently, many lack the necessary technical knowledge or procedural experience to manage complex environmental cases that demand both legal and scientific expertise (Matić Bošković & Kostić, 2023: 85). This absence of specialization directly affects the ability to identify investigative priorities, formulate effective prosecutorial strategies, and interpret complex expert evidence.

The shortage is exacerbated by the limited capacity and engagement of environmental inspectorates, which serve as frontline actors in detecting environmental violations. These bodies are frequently understaffed, under-resourced, and equipped with outdated monitoring technologies (Nicović, 2025: 34). Such structural deficiencies diminish the overall responsiveness of the enforcement chain and undermine prosecutorial effectiveness.

Comparative European experience offers a stark contrast. In several EU member states, most notably Italy and the Netherlands, specialized environmental prosecution offices operate in close partnership with dedicated police units and technical agencies, forming integrated enforcement frameworks (UNEP & INTERPOL, 2016). These arrangements enable the establishment of multidisciplinary investigative teams in which prosecutors, environmental experts, forensic scientists, and inspectors collaborate from the outset of the investigation (Billiet & Rousseau, 2017: 288). The benefits of such models allow for early evidence preservation, ensure that complex forensic requirements are identified at the start, and facilitate consistent legal qualification of environmental harm.

In Serbia, by contrast, the enforcement landscape is characterized by fragmented and siloed operations, and there is a persistent lack of structured inter-agency coordination mechanisms (Matić Bošković, 2022b: 87). Information exchange between prosecutors, environmental inspectorates, police units, and environmental agencies is often ad hoc and reactive rather than systematic. As a result, investigations suffer from delays in evidence collection, duplication of efforts, and, in particularly problematic cases, the expiration of statutory limitation periods before prosecutions can be initiated. These coordination gaps undermine both the deterrent effect of environmental law and public confidence in environmental justice.

The experience of EU jurisdictions with specialized and integrated structures underscores the potential gains Serbia could achieve by reforming its institutional architecture for environmental crime prosecution. Establishing dedicated environmental prosecution units, coupled with formalized protocols for cross-sector collaboration, would not only address existing capacity gaps but also enhance the consistency, efficiency, and credibility of environmental enforcement. Without such reforms, the country risks perpetuating a system in which environmental offences remain chronically under-investigated and under-prosecuted, despite their significant ecological and societal impact (Kostić & Matić Bošković, 2025: 62).

ENFORCEMENT DEFICIT: LOW PROSECUTION AND CONVICTION RATES

Empirical data from the Supreme Public Prosecutor's Office (SPPO) and judicial statistics confirm a persistent enforcement gap in the prosecution of environmental crime in Serbia. Between 2006 and 2017, environmental offences constituted less than 1 percent of all criminal indictments, with even fewer cases resulting in final convictions (Jović et al., 2021). The problem is not merely quantitative but qualitative, most prosecuted cases involve low-level misdemeanours or negligence-based offences,



such as illegal hunting or minor forestry violations, rather than organized, corporate, or transnational environmental crime, despite the acknowledged prevalence of such activities in high-impact sectors like mining, waste management, and construction.

More recent data from the SPPO's *Report on the Work of Public Prosecutor's Offices in Combating Crime and Protecting Constitutionality and Legality* (2024) reinforce this conclusion. In both 2023 and 2024, public prosecutors received a significantly higher number of criminal reports than the number of indictments filed or convictions rendered in cases concerning environmental offences.⁶ While 2023 saw a slightly higher volume of reports, indictments, and convictions than 2024, the data point to a consistent attrition rate between initial reports and successful prosecutions.⁷

For instance, in 2024, the largest share of criminal reports concerned forest theft (1,610 reports, including cases carried over from previous years). Yet, of the 1,610 total forest theft reports handled that year, only 297 resulted in indictments and 229 in convictions. Similarly, for the offence of illegal processing, disposal, and storage of dangerous substances, 303 reports (including cases carried over from previous years) led to 131 indictments and 110 convictions, representing a relatively higher conviction-to-indictment ratio but a modest conversion rate from total reports to convictions. These disparities illustrate how the success of environmental prosecutions is closely tied to the quality, timeliness, and completeness of evidence provided to prosecutors, a challenge repeatedly underscored in interviews with public prosecutors from basic public prosecution offices.

The lowest number of reports in 2024 related to high-risk but complex offences such as illegal construction of nuclear facilities (1 report, no indictment), illegal construction and commissioning of facilities and plants that pollute the environment (3 reports, no indictment), transmission of infectious diseases in animals and plants (4 reports, no indictment), and environmental damage (20 reports, no indictment). In each case, the absence of prosecutions raises concerns about the adequacy of evidence gathering and the technical capacity to substantiate charges. Prosecutors frequently noted deficiencies in cooperation with competent inspections, insufficient technical equipment for environmental investigations, and a lack of secure facilities for storing hazardous substances as evidence, all of which contribute to evidentiary weaknesses (Matić Bošković, 2022b: 83).

The 2023 data reveal similar trends. That year, the largest number of criminal reports again concerned forest theft (979 reports, 319 indictments, 287 convictions), followed by environmental pollution (203 reports, 131 indictments, 137 convictions), killing and abuse of animals (162 new reports, 34 indictments, 34 convictions), and illegal processing, disposal, and storage of dangerous substances (165 new reports, 87 indictments, 54 convictions). Strikingly, the number of criminal reports for environmental pollution in 2023 was nearly seven times higher than in 2024 (203 vs. 31), suggesting either a change in reporting patterns or a decline in detection rates.

A key structural issue is that the majority of environmental crime reports originate from the police, with inspection bodies contributing only a marginal share. For example, in 2023, out of 203 reports of environmental pollution, 168 were filed by the police and only 10 by other state authorities. The lack of obligations for inspection bodies in special laws to submit criminal reports, combined with insufficient knowledge of relevant criminal law provisions, appears to limit their proactive role in criminal enforcement. By contrast, comparative examples underscore the important role that inspections can play, as they possess specialised expertise and cooperate closely with the police in gathering evidence (Faure & Heine, 2005: 11). In addition, the data show that several reports are submitted by injured

⁶ See the Supreme Public Prosecutor Office, *Report on the Work of Public Prosecutor's Offices in Combating Crime and Protecting Constitutionality and Legality for 2024, March 2025*: <http://www.vrhovnojt.gov.rs/docs/Izvestaj-VrhJT-za-2024-godinu.pdf>

⁷ See Supreme Public Prosecutor Office, *Report on the Work of Public Prosecutor's Offices in Combating Crime and Protecting Constitutionality and Legality for 2023, March 2024*: http://www.vrhovnojt.gov.rs/docs/SKM_95824041013280.pdf



parties, which is similar to the practice in comparative examples where complaints by private parties to the prosecutor's office represent only a very small fraction of the overall case intake (Billiet & Rousseau, 2017: 289).

The enforcement deficit is further compounded by the inadequacy of penalties. Sanctions imposed by courts are frequently minimal, often limited to conditional sentences or administrative fines (Alimpić, 2022: 1327). Such penalties fail to reflect the gravity of ecological harm and lack the deterrent effect essential to environmental criminal law. This undermines the preventive function of the law and may contribute to the perception of environmental crime as a low-risk, high-reward activity.

Ultimately, the combined effect of under-reporting by key administrative actors, insufficient investigative specialization, weak evidentiary frameworks, and lenient sentencing practices creates a systemic environment in which environmental offences are rarely prosecuted to their full extent. This reality not only diminishes the deterrent effect of criminal law but also erodes public confidence in the capacity of the justice system to safeguard environmental integrity. Comparative European experience, where higher prosecution and conviction rates are achieved through specialized units, multidisciplinary investigative teams, and structured cooperation between police, prosecutors, and inspections (UNEP & INTERPOL, 2016), suggests a clear pathway for reform in Serbia.

COMPARATIVE INSIGHTS

Best practices from EU jurisdictions demonstrate that effective environmental crime prosecution hinges on three pillars: specialization, inter-agency cooperation, and scientific integration. Norway (*National Authority for Investigation and Prosecution of Economic and Environmental Crime*)⁸ and North Rhine-Westphalia in Germany (Central Office for the Prosecution of Environmental Crime in North Rhine-Westphalia)⁹ have adopted centralized systems for environmental investigation and prosecution, providing technical expertise directly to prosecutorial teams. These centralized forensic hubs allow for rapid evidence analysis, reduce procedural delays, and improve the admissibility and probative value of scientific findings in court. Across these models, the establishment of robust data-sharing mechanisms and centralized reporting systems has facilitated more proactive enforcement strategies, shifting the prosecutorial approach from reactive case handling to strategic crime prevention.

Spain provides an especially informative example for Serbia. At the national level, the *Unidad de Medio Ambiente y Urbanismo* (Unit for the Environment and Urban Planning)¹⁰ operates within the State Public Prosecutor's Office, handling exclusively environmental and urban planning offences. Approximately 800 prosecutors in Spain are dedicated to environmental crime suppression, and their work is supported by the specialized training of the Civil Guard in environmental enforcement (WWF Spain, 2022: 26). This prosecutorial focus has yielded a high number of indictments and successful case resolutions, including the dismantling of corruption networks linked to environmental offences. The Unit's functions are defined by the *Organic Statute of the Public Prosecutor's Office* and include direct intervention, or the issuance of binding instructions to delegated prosecutors, in cases deemed of special importance by the State Prosecutor. Its jurisdiction spans offences related to territorial planning, protection of historical heritage, conservation of natural resources and biodiversity, animal welfare, and forest fire prevention.

8 See: <https://www.okokrim.no/oekokrim-in-english.549343.no.html>

9 See: <https://polizei.nrw/en/article/environmental-crime>

10 See: <https://www.fiscal.es/-/medio-ambiente>



The Spanish model's organizational strength lies in its coordinated structure – the unit is led by a coordinator for the environment and urban planning, who supervises specialized environmental prosecution departments across Spain, collects regular reports, and unifies prosecutorial criteria through the issuance of guidelines.¹¹ This networked approach ensures consistency in prosecutorial practice, enhances legal certainty, and facilitates specialized knowledge exchange. Importantly, the Coordinator can recommend to the State Prosecutor the issuance of general instructions or, where necessary, the temporary reassignment of prosecutors from specialized departments to priority cases (WWF Spain, 2022: 27).

In Serbia, where the number of public prosecutors is limited and the creation of a specialized prosecutorial office for environmental crime poses significant institutional and resource challenges, the Italian example offers a pragmatic alternative. Italy has not established a separate environmental prosecution office; instead, it strengthened coordination by requiring that investigations into the most serious environmental crimes be reported to regional Prosecutors General and the Anti-Mafia Prosecutor (Italian Environmental Network of Prosecutors General).¹² While these bodies do not direct investigations, they play a supervisory role by monitoring practice, identifying inconsistencies, and promoting shared protocols. Moreover, Italy's approach illustrates the advantages of embedding environmental crime enforcement within broader strategies addressing organized crime and corruption, recognising the interconnections between illicit environmental activities, financial crime, and money laundering.

For Serbia, these comparative experiences underscore the value of institutionalizing environmental specialization within the prosecution service. While the establishment of a dedicated national environmental prosecutor's office might be resource-intensive, the creation of specialized departments, staffed by prosecutors with a demonstrated interest and expertise in environmental protection, could offer a feasible and impactful reform. The Council of Europe's Consultative Council of European Prosecutors (CCPE) has explicitly emphasized that environmental crimes are "complex offences" requiring multidisciplinary approaches and regular reviews of legal and procedural frameworks to remain effective (CCPE, 2022). Without such structural reforms, Serbia's environmental enforcement is likely to continue underperforming in both deterrence and prosecution outcomes. Coupled with formalized cooperation protocols between prosecutors, inspectorates, police, and independent scientific institutions, such a model would not only improve case outcomes but also help close the persistent prosecution gap documented in Serbian practice.

CONCLUSION

The article demonstrates that environmental crime prosecution in Serbia faces persistent structural, procedural, and evidentiary challenges that significantly undermine the effectiveness of the criminal justice response. Despite the existence of a substantive legal framework for environmental protection, the enforcement gap remains substantial, as reflected in the low proportion of environmental offences among total indictments, less than 1 percent between 2017 and 2022, and conviction rates are even lower.

The data further reveal that the majority of criminal reports, often over 90 percent, are submitted by the police, while other state bodies, such as environmental inspectorates, play only a marginal role in initiating criminal proceedings. This reflects both the absence of legal obligations for certain inspection authorities to submit criminal complaints in their specific legislation and a broader lack of familiarity with the criminal law dimensions of environmental protection. The result is an over-reliance on police detection and a missed opportunity to capitalise on the preventive and investigative potential of other regulatory actors (Kostić, 2024: 217). Practitioners report chronic under-resourcing, limited

11 See: <https://www.fiscal.es/web/fiscal/-/medio-ambiente?assetCategoryId=36757>.

12 See: https://www.procuracassazione.it/resources/cms/documents/Fimiani_Heraklion.pdf



prosecutorial specialization, procedural hurdles in admitting technical evidence, and weak coordination with inspectors and technical agencies (Matić Bošković, 2022b: 79).

This deficit is compounded by a lack of prosecutorial specialization, insufficient integration of scientific expertise into case preparation, and fragmented cooperation among key actors, including prosecutors, environmental inspectorates, and police authorities. The findings align with earlier assessments in comparative practice, which stress that environmental offences, due to their complexity, require tailored investigative strategies, robust interagency coordination, and access to specialized forensic support (Bisschop & van Wingerde, 2022).

In order to address these shortcomings, Serbia must embark on a strategic reform path that strengthens institutional capacity at multiple levels. The establishment of dedicated prosecutorial units for environmental crime, whether at the national or appellate level, would provide a focal point for expertise, facilitate consistency in prosecutorial approaches, and enable more effective supervision of complex cases. Comparative experiences from Spain demonstrate that prosecutorial specialization, when coupled with formalized cooperation protocols and integration with specialized law enforcement bodies, can markedly strengthen enforcement and, in some cases, uncover broader criminal networks. Enhanced investigation capacity and improved inter-agency coordination in Spain, particularly through Nature Guardians, contributed to a 110 percent increase in the detection of environmental offences, illustrating the effectiveness of this integrated approach.¹³

Reforms should also prioritise the institutionalisation of environmental forensics as an essential investigative tool. Centralised laboratories, independent expert networks, or formal partnerships with academic institutions could provide prosecutors with the scientific evidence necessary to establish causality and quantify harm, two of the most significant evidentiary barriers. As observed in Norway and Germany, embedding technical expertise within prosecutorial workflows can significantly enhance the admissibility and persuasiveness of evidence presented in court (UNEP, 2018; Sina, 2015: 75).

Equally important is the strengthening of cross-sectoral coordination. The lack of effective coordination between prosecutors, inspectorates, and police in Serbia results in procedural delays, loss of evidentiary value, and in some cases the expiry of statutory limitation periods. Drawing on Council of Europe recommendations (CCPE, 2022), Serbia should formalise inter-agency working arrangements through memoranda of understanding, joint investigation protocols, and regular joint training exercises (Alimpić, 2022: 1330). Such arrangements would not only improve the quality of evidence at the indictment stage but also contribute to preventive monitoring and early detection of offences.

Finally, these institutional reforms must be accompanied by a cultural shift in enforcement priorities. Environmental crime should no longer be treated as a marginal or low-priority category but rather recognised for its significant ecological, economic, and societal impacts. Aligning Serbia's enforcement practices with evolving EU standards, including those envisaged in Directive (EU) 2024/1203 on the protection of the environment through criminal law, would also strengthen the country's alignment with its EU accession obligations (Gudin, 2024: 342). This alignment requires not only legislative harmonisation but also enforcement and demonstrable progress in prosecution rates, sentencing severity, and deterrence outcomes (Faure & Lu, 2024: 324).

In sum, closing the environmental crime prosecution gap in Serbia will require a multifaceted reform strategy, establishing prosecutorial specialization, institutionalising access to scientific expertise, and embedding coordination mechanisms across enforcement agencies. These measures, underpinned by comparative best practices and international standards, would not only enhance prosecutorial effec-

13 See: https://environment.ec.europa.eu/news/natures-guardians-enhancing-effectiveness-and-efficiency-response-environmental-crime-2024-03-14_en#:~:text=Notably%2C%20there%20has%20been%20a%2062%25%20reduction,Spain%20and%20an%2087%25%20increase%20in%20Portugal.



tiveness but also reinforce public confidence in the state's capacity to protect the environment as a public good. Without such determined action, Serbia risks perpetuating a cycle of under-enforcement in which environmental harm remains invisible to justice.

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RETURN OF FOREIGN TERRORIST FIGHTERS AND THEIR FAMILIES TO EUROPE AS A POTENTIAL SECURITY PROBLEM

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ABSTRACT

Purpose: This paper examines the return of foreign terrorist fighters and their families from Syria to Europe, that is, their countries of origin. For several years now, dozens of thousands of terrorists have resided with their families in camps (such as Al Hol and Al Roj) previously controlled by the Kurdish forces, with the financial and logistical help of the US. After the fall of the Syrian regime of Bashar al-Assad and the arrival of Donald Trump as the head of the United States, the attitude towards this phenomenon changed. There is an intention to disband the camps and return the terrorists with their families to their countries of origin. The fundamental research question is: Are the European countries ready for their return?

Design/Methods/Approach: Using the content analysis of the existing deradicalization and disengagement programs, the author examines to what extent Europe is prepared for the return of these people. Further, relevant studies were also used, with a special reference to the Western Balkans. The author also used in-depth interviews to collect relevant data.

Findings: The conclusion is that the return of terrorists and their families represents a serious security risk and a threat to European countries. Even though a vast number of programs with the participation of multi-sectoral teams (social workers, political scientists, psychologists, psychiatrists, criminologists, and the security sector, etc.) were created, Europe will be able to speak of the success of deradicalization only after conducting an evaluation, and this takes time. One of the biggest challenges in the return process can be a disbalance between human rights and security measures.

Originality/Value: The importance of this paper is to identify all potential security problems posed by the return of terrorists (and their families, children, and women) from the battlefield. In addition, the author's intention is to point out certain advantages and disadvantages of modern deradicalization programs through existing examples.

Keywords: FTF, terrorism, deradicalization, Syria, Europe, extremism.

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INTRODUCTION

According to the UN data, around 40,000 individuals from over 120 countries of the world departed for Syria and Iraq during the armed conflict (UNODC). Of this number, 80% of them decided to join some terrorist organization (mainly the “Islamic State”² and “Al Nusra Front”), making an army of a total of 100,000 fighters. Without a doubt, the war in Syria, which began in 2011, was the main generator for the recruitment of foreign terrorist fighters.

The most dominant action among terrorist organizations in the Syrian conflict was achieved by the “Islamic State”, which lost control over the majority of territories in 2017. This had some significant consequences not only for terrorists, but also for their families, which they brought along with them (or founded in the meantime, in the so-called caliphate of the “Islamic State”). A certain number of foreign terrorist fighters were killed in action, some escaped to other countries, there were some located in Syrian prisons (such as the one in Hasaka), and some individuals returned to their countries of origin (independently or organized), where they are serving prison sentences.

During 2024, two turning-point events occurred, which would, to a great extent, define the future of the terrorists and their families. The first one was indeed the victory of Donald Trump and the new US administration, and the second one was the fall of the regime of Bashar al-Assad and the arrival of the former HTS³ terrorist, Al-Shaara (Jolani), to power. Trump’s victory in the elections led to significant changes in foreign policy, among which is also the decision of the US to cease financing different international projects. Among them is also the decision to disband camps in the northeastern part of Syria (Al Hol and Al Roj), predominantly holding women and children of foreign terrorist fighters, controlled by the Kurdish forces. According to the estimates (OCHA) for the time being, there are “around 2,600 individuals, of whom 65% children, in Al Roj camp” (Djoric, 2025). On the other hand, Al Hol camp is much bigger and is currently housing around 23,000 individuals from more than 60 different countries from all parts of the world (not including Syria) (Djoric, 2025).

On the other hand, Jolani and the HTS were removed from the list of terrorists in a certain number of countries, with a promise that the new Syrian government would establish peace and fight against the remainder of terrorist groups. As a “reward” for such transformation of former terrorists, lifting of international sanctions and putting under control the new Syrian leadership was expected.

One significant question remains within these geopolitical games, which is as follows: What will happen with terrorists and their families who are still trapped in Syrian camps? The response is simple – they will return to their countries of origin. However, this process is not easy at all, because it carries along a series of security, social, health and psychological, economic, and political issues. It seems that a big challenge will be working with women and children returnees, for whom no evident proof has been found regarding their participation in war crimes or terrorism, and for whom there is a big possibility that they are radicalized (besides the fact that many of them are also the victims). Some countries accepted a certain number of their citizens from Syrian camps, while others are just preparing for this process. One is sure – they will all return to their countries of origin. Because of that, in this paper, we will research some models of the return of the FTFs and their families to create a comprehensive image of the challenges of their return and potential solutions, and, above all, to see how prepared primarily Europe is for their return. The focus of this research will be on several key EU countries, as well as the countries of the Western Balkans.

2 There are different names and acronyms used for this terrorist organization: IS, ISIS, ISIL, DAESH. They changed depending on the time of existence and the territory controlled by this terrorist organization.

3 HTS (Hay’at Tahrir al-Sham) is a terrorist organization, previously a chapter of Al Qaeda.



THE PHENOMENON OF FOREIGN TERRORIST FIGHTERS

The foreign terrorist fighters represent a phenomenon that has relatively recently been defined within the academic and institutional context. The UN Security Council defined foreign terrorist fighters in Resolution 2178, passed in 2014, as “individuals who travel to a State other than their States of residence or nationality for the purpose of the perpetration, planning, or preparation of, or participation in, terrorist acts or the providing or receiving of terrorist training” (OHCHR, 2018). By the way, the term foreign terrorist fighter (FTF) was mentioned for the first time in the UN Security Council Resolution 2170, even though its definition was not explicitly provided. The said resolution condemned violence conducted by terrorists of the “Islamic State” and “Al Nusra Front”. When speaking of other international documents that deal with the issue of FTFs, the Additional Protocol to the Council of Europe Convention on the prevention of terrorism from 2015 should be mentioned as well. Several important articles from this document deal with the issue of FTFs (Council of Europe, 2015):

- Article 4. Traveling abroad for the purpose of terrorism
- Article 5. Funding traveling abroad for the purpose of terrorism
- Article 6. Organizing or otherwise facilitating traveling abroad for the purpose of terrorism

It can be said that the contemporary phenomenon of foreign terrorist fighters developed in three phases (Đorić & Obrenović, 2024a):

1. The first phase corresponds with the war in Afghanistan, when predominantly Arabs from the Middle East joined Al Qaeda in the fight against the Soviets in the 1980s of the 20th century.
2. The second phase is characteristic of the Middle Eastern elite, which was mainly educated in the countries of the West, only to join Al Qaeda training camps in Afghanistan in the 1990s.
3. The third phase is shaped by the so-called principle of the “leaderless Jihad”, based on a non-fragmented structure. This phase was not that much (unlike the previous two) oriented towards camps, but towards the use of social networks and online communication.

It is believed that currently a “fourth wave” of the development of foreign terrorist fighters is underway, who are (primarily) predisposed by the emergence of the “Islamic State” terrorist organization, and for whom decentralization, online radicalization (Dobrucka, 2024) and massiveness of a global character are distinctive.

It is quite important to differentiate the terms *foreign terrorist fighters* and *foreign fighters*, which are of a similar character, but at the same time differ in some important ways. The most significant difference lies in the fact that foreign terrorist fighters exclusively join terrorist organizations, while, on the contrary, foreign fighters become an integral part of some armed groups, such as, for example, official army in wars. However, the *genus proximum* of these two phenomena is the departure from the country of origin abroad to join the fighting, usually motivated by a specific ideology.⁴ This is also accompanied by the definition provided by the Geneva Academy of International Humanitarian Law and Human Rights, which defines the term foreign fighters as “individuals who leave their country to join an armed group abroad, driven by ideology, religion, or kinship” (Geneva Academy of International Humanitarian Law and Human Rights, 2014). The example of foreign fighters can be found in the times of the Spanish Civil War (1936-1939), when General Franco was supported by Hitler, Mussolini, and Salazar with their fighters, while around 40,000 volunteers originating from more than 50 countries of the world fought on the side of the Republic (Muzej istorije Jugoslavije, 2006). The best example of contemporary wars in which foreign fighters take part is the war in Ukraine, in which fighters motivated by ideology, but also money (i.e., military companies) can be found.

⁴ Besides ideology, one of the most common motives found is money.



Some theoreticians attempted to classify foreign terrorist fighters using relevant criteria (Venhaus, 2010). Thus, using that classification, we may single out the following types:

1. Revenge seeker - we are speaking mainly of the frustration-aggression of an individual who reaches his goal thanks to the revenge through a terrorist act.
2. Status seeker – here we have individuals who strive towards acquiring respect and status (they usually do not possess) through destructive action, i.e., terrorism.
3. Identity seeker – terrorists often need to belong, which they realize through group identity, i.e., by joining a terrorist organization. For such individuals, a terrorist group represents a sort of surrogate family and a place where they feel safe “in their skin”.
4. Thrill seeker, i.e., the adrenaline type – this is a type of foreign terrorist fighters who possess an adventurous spirit, and thus, through terrorist actions, they find the meaning of life that moves them and incites them to activism.

Even though this classification is a little bit archaic (since it predominantly referred to Al Qaeda members), it is still applicable to contemporary FTFs. Three more categories of contemporary terrorist fighters could be added as follows:

- Ideologically motivated FTFs – we are speaking of terrorists exclusively motivated by the value system they fight for, i.e., the ideology. At the same time, they are most problematic when speaking of the deradicalization process, since they have difficulties denouncing their value system.
- Mercenaries or popularly called “dogs of war” – these are individuals to whom money, i.e., lucrative interest, is the only category. When the flow of money ceases, they are no longer interested in terrorist activities, since that is their primary motive.
- The last category of FTFs refers to individuals who suffer from some sort of mental disorder. At this point, some caution is needed upon making conclusions, because suffering from a mental disorder does not necessarily correlate with violence, i.e., terrorism (Đorić, 2024b). On the other hand, some researches have shown that depression, narcissistic personality disorders, PTSD, etc., can be generators of terrorist actions.

Essentially, the phenomenon of foreign terrorist fighters today predominantly refers to those who departed for Syria and Iraq to join some of the terrorist organizations (“Islamic State” or “Al Nusra Front”) active there. Since their return is imminent (including their families), it is of crucial importance to examine whether the countries of Europe are ready to receive them. First, we will provide a review of some Balkan countries, and then, the focus will be on the EU countries.

FOREIGN TERRORIST FIGHTERS AND THE WESTERN BALKAN COUNTRIES

The Western Balkans is a political (and not geographical) construction which includes the ex-Yugoslav countries (without Croatia and Slovenia, as they are the EU members) and Albania. In fact, we can say that the Western Balkans represents European countries that are in the waiting room of the EU accession striving towards full membership (Đorić, 2024c). Besides numerous political and economic problems, the Western Balkan region faces specific security problems as well. One of them is surely the return of foreign terrorist fighters and their families from Syria to this region.

It is believed that in the period from 2012 to 2016, around 1,110 adults departed from the Western Balkans for Syria and Iraq to join terrorist organizations (Buljubašić & Azinović, 2023: 20). Three countries from this region (Bosnia and Herzegovina, Montenegro and North Macedonia), as well as



the Autonomous Province Kosovo and Metohija, are in the top ten countries with the highest number of foreign terrorist fighters compared to the total number of inhabitants (Florida, 2016). This is at the same time the reason why the focus in this paper will be on the countries of the Western Balkans. Besides this fact, it should be mentioned that the Western Balkans (and especially the Kosovo and Metohija region) are the “black hole” of Europe in terms of crime and terrorist activities, which then spread to other European countries as well.⁵

In the majority of the Western Balkan countries, the repatriation process is conducted in four phases: preparation, logistics, reintegration, and resocialization with rehabilitation. In the following section, we will provide several characteristic examples of how Balkan countries prepare for the return of terrorists from Syria through case studies of the countries of this region.

Serbia is a country from which a total of 49 adult citizens (37 men and 12 women) departed for Syria and Iraq (Đorić, 2024d: 73).⁶ At this moment, this number has reached 56, because, in the meantime, some children who departed with their parents became adults (Djoric, 2025). The Prosecutor’s Office for Organized Crime filed charges against seven individuals accused of conducting serious crimes regarding terrorist activities in the territories of Syria and Iraq. Out of seven convicted individuals, three were arrested in 2014, one was deported from Turkey in 2016, while the last three are still out of reach of the competent authorities. During 2019, all these individuals were sentenced to a total of 69 years and 9 months of imprisonment.⁷ Until now, the return of children has not been registered, while in 2024, we registered one (illegal) return of a woman, who reached Serbia from Syria via Turkey (Djoric, 2025). She had left two underage children in Turkey, for whom she filed a request to be deported to Serbia. In 2021, the Republic of Serbia passed a plan for dealing with foreign terrorist fighters and their families. It includes (Đorić, M. 2024d):

1. Preparation activities phase
2. Direct reception of individuals phase
3. Accommodation in the reception center phase
4. Reintegration into the local community phase

When speaking of the so-called Kosovo*⁸, the situation is much more complex, bearing in mind the fact that in April 2019, 110 individuals returned from Syria, and that before that, around 400 individuals, predominantly Albanians, had departed for the Syrian-Iraqi warzone. Upon their return, the men were arrested, while the women were accommodated in the “Vranidol” reception center located near Pristina. Multidisciplinary teams concluded that the majority of the returnees suffered from PTSP, as well as from other illnesses. Since then two types of programs for the returnees have been implemented: the penitentiary-restorative and the program that includes social integration. The said programs have been conducted in cooperation between the Kosovo* institutions and the NGO sector, which is indeed the model practiced in the rest of Europe as well.

North Macedonia was the first country of the Western Balkans to repatriate FTFs and their families in 2018 (NEXUS, 2022). This was conducted at a time when this country was not ready in the institutional and operational context, thus leading to recidivism of terrorism.⁹ The next big wave of returnees was organized on July 17, 2021, when a total of 23 citizens arrived to this country, of which five were

5 The toxic influence of the Western Balkans can also be seen on an international level, since some Balkan crime groups are quite tightly linked with Latin American narco-cartels.

6 Of this number, 10 returned to Europe, 12 were killed, while the rest are most probably located in camps or prisons in Syria.

7 By the way, Serbia is one of the countries in the region with strict penalty policies regarding prison sentences for criminal acts linked with terrorism.

8 Reference should be understood in full compliance with United Nations’ Security Council Resolution 1244 and without prejudice to the status of Kosovo.

9 Upon serving the prison sentence, some of them recommitted the criminal act of terrorism.



women and 14 children (Đorić, 2024d: 82). By the end of 2021, a total of 103 citizens returned, while 37 of them were killed; five of them are still deemed active fighters. Official data show that 156 citizens of North Macedonia departed for the Syrian-Iraqi warzone (Đorić, 2024d: 82).

At this moment, 15 foreign terrorist fighters are serving prison sentences – 10 individuals are located in the Idrizovo Prison, while five of them are in the Štip Prison (NEXUS, 2022:4). The potential problem with Macedonian prisons is that FTFs are mixed with other prisoners (they are not isolated), which can easily stimulate radicalization of the rest of the prisoners. Prison sentences last from six to nine years; they were imposed upon 13 individuals for participation in foreign warzones (Đorić, 2024d).

In 2020 North Macedonia adopted the “National Plan for Reintegration, Resocialization, and Rehabilitation of Foreign Terrorist Fighters and the Linked Family Members”, in which the phases of their return are defined.

1. Gathering security intelligence.
2. The arrival of FTFs and their families (security and medical check-ups, DNA analysis of children to determine who their parents are).
3. Two-week quarantine of the returnees in case they will not be prosecuted (medical and social programs for women and children), and incarceration for the ones who will be prosecuted.
4. Integration into the local community.

Besides state institutions, international subjects such as GCERF, MYLA, MCMS, and UNICEF have taken part in this process of repatriation, reintegration, and rehabilitation to a significant extent.

As regards **Bosnia and Herzegovina**, between 250 and 300 of its citizens departed for the Syrian-Iraqi warzone according to official data (Đorić, 2024d). According to other sources, this number is much higher, reaching 360 people (Slobodna Evropa, 2021). From 2014 to 2022, “35 individuals were processed before the Bosnia and Herzegovina Court for the criminal acts linked with terrorist organizations in foreign warzones” (Buljubašić & Azinović, 2023: 14).

It is hard to state the exact number of individuals who returned to the country, since in the beginning, there were a lot of individual illegal returnees, but it is believed that, until now, a total of 62 adults and 22 children were repatriated (eight children of parents who had the B&H citizenship departed to other countries). It is believed that around 50 people are still located in prisons and some camps in the northeastern part of Syria. A big collective repatriation was organized with the help of the US in December 2019. At that point, 25 individuals returned to B&H (7 men, 6 women, and 12 children) (Đorić, 2024d). Upon their return, they were accommodated in the Delijaš Reception Center, where they were provided with the necessary medical aid. After nine days in this center, the women and children were transported to their previous places of residence (Hadžići, Zenica, Tuzla, Čelić).¹⁰ The newest information shows that Bosnia and Herzegovina is expecting new repatriations during 2026.

Interestingly, information from the field (from Al Hol and Al Roj camps) shows that, for example, children from B&H speak the Bosnian language, which is not the case with the Albanian children – they predominantly speak Arabic.¹¹ It is believed that around 100 individuals (women and children) are waiting for the return to B&H. The Ministry of Security of the B&H has, with the assistance of the Netherlands and international organizations (and especially IOM), provided financial funds used for conducting rehabilitation and reintegration of the returnees.

The majority of the Western Balkan countries qualified participation in foreign warzones as a criminal act in the period of 2014-2015, using the institutional and legal mechanisms. The length of the penalty differs from country to country. Moreover, it should be stressed that the Balkan countries have passed

¹⁰ Information that some children feared silence is interesting, given that it points to the existence of a traumatic disorder.

¹¹ Information from an international gathering (Chatham House Rules).



some strategic documents that deal with this phenomenon and which are included within strategies for the fight against terrorism (Đorđević & Miljković, 2025) and extremism.¹²

The current security situation in Syria is such that Al Shaara (Jolani) is accepted by the international community as a legitimate leader, within whose ranks of the government, there are the former jihadists from the Western Balkans. So, for example, the Albanian from North Macedonia, Abdul Samrez Jashari (also known by the name Abu Qatada al-Albani) was given a high position within the military organization structure (France 24, 2024). This Islamist, who has been under the US sanctions since 2016, was the leader of the “Xemati Alban” terrorist group, which predominantly consisted of jihadists of Albanian origin. The said facts can pose a significant security challenge for the FTF punishment policy in their countries of origin, and can also act as a generator of terrorist activities not only in the Balkans, but in the rest of Europe as well.

FOREIGN TERRORIST FIGHTERS AND THE EU COUNTRIES

Around 5,000 individuals departed from the EU for Syria and Iraq to join some of the terrorist organizations, while 30% of them have already returned to their countries (European Council). Of the total number of women, only 20% returned to their countries of origin.¹³ This data shows that the European Union countries are expecting the return of a significant number of the FTFs and their families. The main question is whether Europe is ready for this undertaking. In order to understand this situation best, we will present several examples from the EU in terms of programs that are being implemented regarding repatriation, reintegration, and rehabilitation.

France is an interesting case for analysis, above all because it conducted the highest number of repatriations in comparison to other European countries. This country identified around 1,500 of its citizens who departed for Syria and Iraq in the previous years (Foreign terrorist fighters info, 2025). France is still the forerunner regarding the number of female departees, which makes up 30% of the total number of individuals who departed for the Syrian warzone. Besides that, for many years now, it has been at the top of European countries in terms of arrested terrorists. It should also be mentioned that it has created a significant number of programs for the FTFs and their families.

A dozen years ago, this country formed one of the first centers (boarding) for deradicalization, called CPIC in Beaumont-sur-Vernon. This project was housed in the Château de Pontourny castle from the 18th century, and the participants aged 18 to 30 volunteered for the deradicalization process.¹⁴ The program they attended consisted of various fields, such as culture, philosophy, sports, religion, etc., led by multisectoral teams consisting of psychologists, psychiatrists, pedagogists, and social workers. France invested a large sum of money (2.5 million euro) into a project that fell apart soon. This experience led to the abandonment of the deradicalization process (Đorić, 2021: 84). Namely, this country is increasingly advocating for the de-engagement process in the work with violent extremists and terrorists.

The main institution dealing with the prevention of radicalization and violent extremism is the Interministerial Committee for the Prevention of Crime and Radicalization (*Comité interministériel de prévention de la délinquance et de la radicalisation* – CIPDR). It includes the Secretariat, which is, as an administrative body, in charge of solving the problem in practice and on a local level. Based on the law passed in 2016, all FTFs are systematically being prosecuted. Speaking of children, we must point out that they can face legal consequences as well if there is proof of their participation in criminal acts.

12 In some countries, the strategies regarding the fight against extremism and violent extremism are separated, and in some, they are united.

13 Information from an international gathering (Chatham House Rules).

14 The principle of voluntariness is, at the same time, the biggest weakness of this process.



If there is no evidence, underage individuals are included in a specific rehabilitation and reintegration program. The procedure for child returnees includes the following phases:

1. First medical check-up
2. Departure to the child protection service
3. Second medical check-up
4. Investigative procedure and educational measures
5. Schooling

In the course of eight weeks, the Unit for Radicalization Assessment (consisting of trained professionals and experts) evaluates individuals who are held in regular detention or isolation. The creation of five such units is planned, able to cover 183 places in which these assessments would be conducted.

The departmental unit for the prevention of radicalization and family support has quite a significant role – to identify the reasons for the radicalization of individuals and entire families. This is exactly why this department is working on the following processes:¹⁵

- Help to develop social potential.
- Help to develop critical thinking, freedom of thought.
- Support families to consolidate their bonds and to face psychological distress.
- Support socio-professional accompaniment and access to rights.

Based on the data from 2024, we can state the following conclusions regarding the de-engagement programs:¹⁶

- 362 families are being monitored in the context of the prevention of extremism and radicalization.
- 5,000 individuals are under some sort of monitoring (there is a slight increase in comparison to 2023).
- 56% are men.
- 63% are younger than 18.

When speaking of **Germany**, the German Federal Domestic Intelligence Service (*Bundesamt für Verfassungsschutz*) estimates that more than 1,050 people departed from this country for Syria and Iraq to join some of the terrorist organizations (ICCT, 2019). Other estimates state that the number is around 1,150 people (Bundesministerium des Innern und für Heimat ²⁰²²). The existing data show that predominantly men departed (79%), while women represent a minority (21%), as well as that they were predominantly younger people with an average age of the foreign terrorist fighter being 25.8 (Heinke, 2017).

This country has several programs focused on the deradicalization of the returnees from war zones. One of them is the PERSIST (Project on the long-term Education, Rehabilitation and Social Integration of children in extremism-affiliated family Structures) program, under the jurisdiction of the BAMF (Federal Ministry of Migration and Refugees).¹⁷ The basic goal is to ensure long-term support to children residing in radicalized families.

The current experience has shown that the biggest challenges to children in such problematic families are as follows:

- Emotional dysregulation
- Concentration issues
- Attachment disorders
- Cognitive developmental delays
- PTSD, depression, anxiety

¹⁵ Taken from an international gathering of an expert group (Chatham House Rule).

¹⁶ Chatham House Rule

¹⁷ It was launched in January 2024 and will last until December 2027.



This program pays special attention to mothers with children returning from Syria to Germany. The previous practice has shown that these children are traumatized, and that they usually exhibit a delay in development, which demands learning assistance (in schools). The lack of knowledge of the German language for child returnees is another in the series of challenges, since they predominantly speak Arabic.

There is often a common problem in the family dynamics of returnees. It is not a rare occasion that, upon their return from Syria, children are taken to foster families, and thus, there is often a conflict occurring between the mother and the foster family. A large number of family members, lack of language proficiency, cultural differences, etc., are just a few of the common issues faced by child returnees and their families. The lack of cognitive and emotional capacities among mothers of these children has also been registered, which only shows that the deradicalization process is quite dynamic and complex.

There is an interesting example within the NGO sector and state institution regarding this issue, depicted in the actions of the Green Bird Organization (*Grüner Vogel*). This is a non-governmental organization in Germany that is a close partner of state institutions, such as the BAMF/BMI, acting with the goal to fulfill tertiary prevention of extremism and violent extremism, as well as de-engagement. Since 2021, the Grin Bird has been a part of the Federal Working Group on Religiously Motivated Extremism (BAG RelEx), and since 2024, it has been a part of the Task Force on Islamism Prevention of the Federal Ministry of the Interior and Community (BMI) (Grüner Vogel, 2021).

In the European Union, there is a common effort to assess the process of the fight against violent extremism, terrorism, and radicalization. The EUKH (EU Knowledge Hub on Prevention of Radicalization) is the major initiative aimed at bolstering the EU's efforts against radicalization leading to violent extremism and terrorism. The EUKH emerged from the EU Counter-Terrorism Agenda 2020, and its main goal is to gather experts from Europe (politicians, academicians, practitioners, NGO...) to create a community of experts from various fields. One of the topics covered by the EUKH is also the issue of the return of FTFs and their families.

The actions of the EUKH are linked with various types of panels participated in, besides the EU member states, there are the Western Balkan states as well (and other countries outside the European continent). Within the seven existing panels, experts meet several times a year, analyzing the most current topics. Even though the thematic panels have their fixed members, *ad hoc* experts from the side are invited quite often if the said topic requires such action.

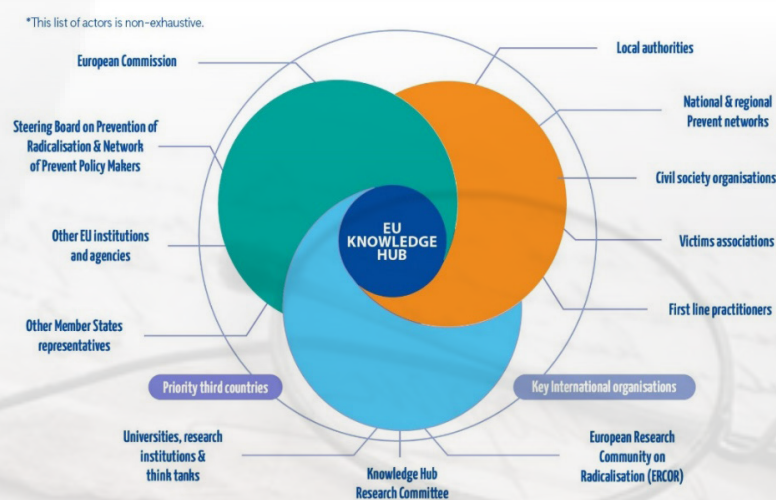


Figure 1: EU Knowledge Hub on Prevention of Radicalization

(source: https://home-affairs.ec.europa.eu/networks/eu-knowledge-hub-prevention-radicalisation/about-eu-knowledge-hub-prevention-radicalisation_en)

The EUKH organizes activities of various types to prevent radicalization and extremism: professional training, study visits, projects, mentorship programs, etc. One of the panels directly dealing with the topic of FTFs is Panel 6 - Management of Foreign Terrorist Fighters, Volunteers and Their Families. Several times a year, experts from Europe (and other parts of the world) meet at this panel and discuss the issues regarding to the return of foreign terrorist fighters, including the challenges, analysis of the current state, and present examples of good practice.

Based on all the previously listed examples, we can conclude that each country in Europe is individually developing its FTFs and their families' repatriation programs. Of course, in this quite complex process, they rely on each other, learning from the existing practices. What is the great unknown for the EU countries and the countries of the Western Balkans is that the efficiency of the existing programs is still vague. We have examples of terrorists who even acquired official certificates that they are deradicalized, which did not prevent them from repeating the criminal act of terrorism, thus making the deradicalization process senseless.¹⁸

It seems that the biggest problem will be the work with children returning from the camps located in the northeastern part of Syria (Al Hol and Al Roj), exactly due to many years of living in quite toxic conditions. In these camps, children are not allowed to play or sing (because of the value system of terrorist ideologies), and thus, the possibility of their radicalization is quite high (including trauma). Women, too, have a chance to radicalize in these camps. The majority of them refuse to return to their countries of origin, while the male members of their families are in prisons in Syria (such as the one in Hasaka).¹⁹ International organizations have identified a high suicide potential among women who spent years in camps.²⁰ Besides that, various forms of violence, including murders²¹, suicides, torture, rapes²², etc., are present in the camps located in the northeastern part of Syria.

The countries of Europe can apply several return models²³:

- To hold FTFs and their families in camps (and prisons) without the possibility of repatriation (which is no longer a sustainable option).
- To repatriate them to their countries of origin and process them (if there is proof).
- Mass repatriation (of a humanitarian character).
- The work of expert teams with a small number of selected returnees.

The return of FTFs and their families will involve numerous security risks, economic, political, social, and cultural issues. One of the main questions is how the domestic environment will accept them: as heroes or as a threat. Moreover, we can also pose the question regarding how the returnees from war-zones who are serving prison sentences will affect the security dynamics (the danger of radicalizing other prisoners as well). Unfortunately, we will get our responses only after the evaluation process, which needs time. The fundamental question is: Does Europe have that luxury of time?

18 Here, we must take into consideration the principle of *taqiyah* in Islam, which often enables terrorists to act as if they were deradicalized.

19 Illnesses such as diphtheria and tuberculosis were identified in prisons.

20 Chatham House Rules

21 There is a case when a mother strangled her daughter due to frustration.

22 Rapes are predominantly conducted by young men (teenagers) who have been stranded in camps for years.

23 Chatham House Rules



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CONSTRUCTION AND REDESIGN OF THE SERBIAN NATIONAL IDENTITY: ARCHIBALD REISS'S ROADMAP

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ABSTRACT

Purpose: The Development of the Serbian National Identity began, even in its early phase, during the monarchist period at the start of the 20th century, to encounter specific challenges of the same or similar nature as those in this field today. These are identity-related issues that are, to a significant extent, caused by the ambivalent character of the Serbian national being. This refers to a specific character structure or collective mentality of the people.

It is important to emphasise that this is not unique to the Serbian people. Based on historical development, what can be singled out as characteristic of the Serbian nation is that its positive traits come to full expression primarily in difficult times. In contrast, quite the opposite occurs in peace and social stability periods. These manifest themselves across various areas of social life, and not only do they prevent the many potentials and capacities of the Serbian people from being realised to a fuller extent, but also lead to society's polarisation.

Design/Methods/Approach: This research aims to show how Reiss's precise mapping of the traits of the Serbian people provides insight into the two faces of the Serbian national character, while also serving as a foundation for creating a responsible and strategic identity policy. Such a policy would be directed toward overcoming identity-related deficiencies and flaws, while at the same time strengthening the positive characteristics. In this way, Reiss's model will effectively serve as a basis for conducting a SWOT analysis—a methodological tool widely used today in strategic public policy development.

Originality/Value: The methodological framework is based on applying qualitative content analysis, primarily of Reiss's crucial work *Listen, Serbs! Beware of Yourselves*, other scientifically relevant studies, and certain media documents. Supplementally, a degree of discourse analysis will also be applied.

Keywords: Serbian national identity, Archibald Reiss, Serbian characterology, SWOT analysis, identity policy

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NATIONAL IDENTITY AND THE CHARACTEROLOGY OF A PEOPLE – CONCEPTUAL DEFINITIONS

Given the aim of this paper, this section will highlight some of the fundamental starting points in defining national identity and the character of a people. Defining national identity in the context of the modern state is a highly complex task (see Stojadinović, 2013: 31–46; 2020: 61–77). Therefore, only an overview of several fundamental concepts of national identity will be provided here, without delving into any deeper analysis (see Stojadinović, 2012).

Suppose we begin with Nikola Božilović (Božilović, 2007). In this case, the concept of national identity originates from an older idea of “national character”, developed in Europe in the 17th century, which, as well as the notion of a “national spirit”, is often associated with stereotypes and prejudices. Equally important is the warning Božilović offers: “We must bear in mind that works associated with the adjective national may have a positive role in constituting national identity, but also an extremely negative and destructive one, in the sense of encouraging those vulgar and animalistic (essentially anti-cultural) traits which are formed under the influence of extreme nationalism as a social phenomenon and its derivatives (chauvinism, xenophobia, ethnocentrism)” (46). According to David Miller, national identity is distinguished from other collective identities by the following characteristics: shared belief and commitment; embodiment of historical continuity; it is an exceptionally active identity; it connects people with a specific geographical territory; and it requires that those who share it have something in common — a common culture (Miller, 1995: 21–27).

Contemporary experience and the time in which we live increasingly confirm, day by day, that — contrary to late-20th-century predictions — not only have nations and national identities not become obsolete categories, but in the existing context of globalization and integration processes, primarily generated by them, the significance of national identity and the need of states to preserve and develop it have strengthened globally (see Mirović, 2012: 79–109).

Anthony D. Smith, at the very beginning of his well-known book *National Identity*, highlights the existence of a Western or “civic” and a non-Western or “ethnic” model of national identity (see Smith, 2010: 11–36). However, we consider such models to be grounded in mutually exclusive concepts based on a simplified, dichotomous approach, which results in an unacceptable opposition between the principles of ethnicity and civility, ethnos and demos, and even between tradition and modernisation. In reality, national identity always represents a complex mixture of ethno-cultural and civic, i.e., territorial-political components—only their proportions vary from case to case (see Mirović, 2008: 1383–1428).

Here, the distinction between the terms ‘people’ and ‘nation’ should also be emphasised. The ‘people’ in the ethnic sense, is a much older category than the nation, and there is no disagreement on this point



among scholars (see Đurić & Stojadinović, 2018: 41–57). Until the formation of the modern state, a people represented a loosely structured community that later became connected through stronger political and cultural values. According to Jerzy Smolicz, at least three models are used to differentiate between criteria defining national affiliation: the ancestry-based model (*ius sanguinis*); the territory-based model (*ius soli*); and a migration-derived model that enables cultural pluralism for diverse social groups forming today's pluralist democracies (Zajda, 2009: 2).

Contrary to those concepts emerging from a (post)modernist perception of the nation as a purely constructivist, virtual, or imaginary category, this paper adopts Smith's ethno-symbolist standpoint, according to which the creation of a nation in the modern sense — and its identity — requires the existence of an ancient ethno-symbolic core (Smith, 1995, 1996). National identity is understood as a category that is not only complex and multilayered, but also developmental and dynamic — not something given once and for all, immutable, but something that can and must be fostered and built upon in accordance with the current conditions of social development (Mirović & Janković, 2023: 134–178; 2025: 182).

It should be noted that contemporary scholarship avoids stereotypes of a “national character” as they easily become ideological, simplified, and unscientific. Instead, modern approaches examine cultural patterns, historical experiences, social institutions, value systems, and structural conditions (including economic, political, and geographical factors). Within this framework, one may speak of cultural-historical specificities that shape behaviour and social tendencies, but not of a fixed “national character”. Such research largely falls under the purview of ethnopsychology, an interdisciplinary field of scientific study. However, within Serbian scholarship, we find notable efforts to study the cultural-historical specificities of the Serbian people, their character traits, and collective mentality within a specific field of characterology of peoples. The most prominent examples include Cvijić's anthropogeographical characterology of the South Slavs and Vladimir Dvorniković's characterology of the Yugoslavs in his 1939 work of the same title; equally indispensable is the contribution of Slobodan Jovanović to the study of Serbian national character. Contributions were also made by numerous other authors such as Dragiša Vasić, Vladimar Karić, Dušan Nedeljković and others, whose analyses were compiled in *Characterology of the Serbs*, edited by Bojan Jovanović (see B. Jovanović, ed., 1992), who himself contributed to this field (B. Jovanović, 1992: 5–22).

When discussing the characteristics of Serbian national identity, Jovan Cvijić emphasised that Serbs belong to various “psychological types” shaped by geography and history. He particularly highlighted the Dinaric type, characterised by energy, a strong sense of honour, courage, patriotism, impulsiveness, and a tendency toward clan- or brotherhood-based organisation. He observed communal morality, solidarity, collectivism, and a pronounced family structure (Cvijić, 2011). Slobodan Jovanović, in turn, stresses that the Serbian political mentality is marked by tension between anarchic individualism and the need for a strong state. He distinguishes between the “patriarchal man” and the modern citizen, while pointing to the weakness of institutions and the historical inclination of Serbs toward charismatic leadership (S. Jovanović, 1990).

However, aside from all the aforementioned characterological studies of the Serbian and Yugoslav peoples, one stands out — not only due to the period of its origin, its systematic nature, precision, and comprehensiveness, but also because it was created by a foreigner who, as it will prove, understood the Serbs better than we understood ourselves. This is the characterology of the Serbian people and their traits as developed by Rudolf Archibald Reiss (1875–1929) in his work, *Listen, Serbs!* Given that the characteristics identified by Reiss have, for the most part, endured among Serbs to this day — something this paper will demonstrate — we may conclude that his characterology has reliably stood the test of time. Yet his contribution goes beyond this: in addition to his manifold contributions to

different spheres of Serbian national, social, and state development, Reiss also left us a kind of guide for building, improving, and preserving our own identity.

THE DEVELOPMENT OF SERBIAN NATIONAL IDENTITY – CHALLENGES IN THE PAST, PRESENT, AND FUTURE

Although national identities—as well as nations and nationalisms—are modern, early-modern categories whose development is closely linked to the Industrial Revolution, one should not overlook their earlier, ethnosymbolic roots. The same applies to the Serbian national identity and its evolution. Namely, the genesis and formation of the Serbian national identity should be viewed as a complex, dynamic, and multilayered process spanning several centuries, and possessing, of course, its own medieval foundations. There are three key determinants from the medieval phase of pre-modern development that have not lost their fundamental, founding role to this day.

The first is the ruling Nemanjić dynasty, which, from the 12th to the 14th century, established the foundations of medieval Serbian statehood and the rudiments of what could be called a Serbian “proto-nation”. The second is the Serbian Orthodox Church (SOC) and, above all, the figure and work of Saint Sava — Rastko Nemanjić — who, as a member of the then-ruling dynasty, renounced worldly power for monastic life. This decision would prove crucial to the Church’s autonomy (see Zorić, 2011: 6). In him, the strong and inseparable bond between Serbian Orthodoxy and the Serbian state-building idea becomes evident, regardless of the secular character of the modern Serbian state. Saint Sava was the founder of the SOC’s autocephaly and its first archbishop, but also a diplomat, a gifted writer, a great Serbian enlightener, and the founder of the Serbian legal tradition based on Byzantine legal sources. This enabled Serbia to be integrated into European and Christian civilisation.² Thus, “the cult of Saint Sava soon joined the cult of Stefan Nemanja. Father and son, Saints Simeon and Sava, thus became eternal symbols of the Serbian people, of their political and ecclesiastical independence—essential components of their national and spiritual consciousness, from which they have not disappeared to the present day” (Zorić, 2011: 6). The third medieval foundational element is the Battle of Kosovo and the Kosovo Covenant.

All these elements played a crucial role in preserving the continuity of the Serbian people’s identity during their challenging existential conditions under centuries of Ottoman rule. Of particular importance for the survival of the Serbian ethnos was the Serbian Orthodox Church, which later led to a certain integration of religious and ethnic identity. As this role of the SOC was once described:

“The Serbian Orthodox Church... during the time of foreign occupation... served as a kind of substitute for the destroyed state — as a pillar of culture and a factor of enlightenment, and as the instrument of the people in their daily life... It did not allow fanaticism, passivity, or fatalism to develop among the Serbs. Instead, it encouraged diligence, love of life, and a sense of responsibility for themselves and for humanity as a whole” (Đurić, 2007: 90).

This mentioned identity and spiritual heritage undoubtedly inspired and gave impetus to the Serbian Revolution (the First Serbian Uprising), as well as to other liberation wars of the 19th century. In this way, the medieval identity-symbolic foundations of the Serbian people played a constitutive role in shaping the modern Serbian nation and its national identity. Therefore, they constitute precisely that ethnosymbolic core of the Serbian nation, in the sense defined by Smith (Anthony Smith). Yet,

² This is Saint Sava’s *Nomocanon* or Code of Laws from the beginning of the 13th century, which was actually the first Serbian legal act and which, as its name suggests, encompassed secular and church law, and represented an authentic synthesis of Byzantine legal sources (so-called legal transplants) adapted to the Serbian social context. More about this in: Zorić, 2011.



they also provided the driving spiritual force behind the glorious liberation and defensive wars Serbia waged in the early 20th century—wars whose military legacy has likewise become a significant marker of Serbian national identity.

However, despite their foundational importance, nearly all of these identity elements are today subject to dispute and debate, both in the broader public sphere and within academic and scientific circles. For example, the Saint-Sava tradition of Serbian nationalism and its advocates have come under fire: “The first great trial of contemporary Serbian spirituality, though a trial ‘from the outside’, is the accusation that by nurturing national consciousness and especially national memory, religion among Serbs becomes politicized and is an expression of so-called clerical nationalism” (Đurić, 2007: 91–92). Yet, among other things, these “accusations are senseless because the ideal, program, and goal of the Church in this case is not political power, not the control or possession of political authority, but the defense and affirmation of the basic preconditions for the humane and spiritual survival of the nation” (91–92). The Battle of Kosovo and the Kosovo Covenant are likewise criticised as being nothing more than part of a so-called “Kosovo myth” and Serbian national mythomania. One must keep in mind that all modern nations possess national and political myths that serve essential integrative and cohesive functions. Moreover, the Kosovo question — especially today, at a time of severe suffering of Serbs in Kosovo and Metohija — cannot be interpreted solely as a mythical issue. In addition, this territory contains the most essential part of Serbia’s spiritual and cultural heritage, making it not only the state-forming but also the spiritual and cultural core of the Serbian nation (see Mirović Janković, 2023: 959–964).

In addition to these, the Serbian people and state face numerous other challenges in the field of identity. Among them is the externally constructed identity, which carries a negative connotation related to the alleged “Balkan” character of the Serbian people. This idea has been scientifically interpreted and essentially explained (Todorova, 1997). Added to this is the identity burden stemming from Western, anti-Serbian political, media, and other propaganda, particularly aggressive during the last decade of the previous century, and continuing long afterwards. This suggests that, alongside internal manipulation, there is also external manipulation of the Serbian national consciousness. All this, working synergistically, has led a part of the Serbian people into a profound identity crisis, fostering negative sentiments toward their own national and political identity, with a desire to distance themselves from it or even replace it with another identity altogether (see Antičić, 2007).

In examining such manipulation as a form of social experimentation on the Serbian people and their identity, it has been observed:

“Most people react fearfully to the mere mention of the adjective ‘Serbian’. The association of the term ‘Serbian’ with every negative thing imaginable has reached such proportions that we react in the same way to any hint of this term... We have been frightened for so long that we have developed a habit of fearing even our own shadow. Anything that contains even the slightest national symbol or national culture evokes fear—as if it were a symbol of suffering and misfortune” (Damjanac, 2015: 101).

Therefore, all this shows that Serbian national identity and its survival at present face the same — or similar — existential challenges as in the past. Moreover, unless we overcome our own internal weaknesses and deficiencies and eliminate the threatening tendencies arising from them, these challenges will likely continue — perhaps in an even more dangerous form — to shape the future of the Serbian people.



THE CONTRIBUTION OF ARCHIBALD REISS TO THE SCIENTIFIC, SOCIAL, CULTURAL, AND IDENTITY DEVELOPMENT OF SERBIA AND THE SERBIAN PEOPLE

Rudolf Archibald Reiss was born into a wealthy family in the southern German province of Baden, in the town of Hechberg, in the settlement of Hausach on 8 July 1875. After completing his primary and secondary education there, he moved to Switzerland, where he continued his studies, earned a doctorate in chemistry, and later became a full professor at the University of Lausanne. In the same year, he also obtained Swiss citizenship (1906).³ Dr Reiss died, however, on August 8, 1929, in Serbia—his second (or third) homeland—where, according to his own wishes, he was buried in Belgrade at the Topčider Cemetery. In accordance with his personal and testamentary wish, his heart was placed in an urn inside a small chapel on Kajmakčalan (the peak of Mount Nidže, or in Greek, Voras, which at that time lay on the border between Greece and Old Serbia and was therefore called by the Serbs “the Gate of Freedom”),⁴ so that he might rest together with his wartime friends, i.e., the fallen Serbian soldiers. For this reason, he was remembered and remains known as “the Swiss on Kajmakčalan” (see Levental, 1984) or as a great man who was “German by origin, Swiss by education, and Serbian by heart” (*Politika*, 2023, August 9).

He arrived in Serbia — in Niš, then the wartime capital — in August 1914, at the invitation of the Serbian royal government, to collect and examine the evidence of violations of international laws of war, namely, crimes committed by the Austro-Hungarian army against the Serbian population during the earliest phase of its aggression against the Kingdom of Serbia — “during the first incursion,” as stated in Reiss’s report, referring to the offensive that lasted from 12 to 24 August 1914 (Reiss, n.d.: 1–3). The reason for such an invitation stemmed from the realisation of the Serbian authorities that, despite their appeals and warnings regarding the severe crimes committed by Austro-Hungarian forces in occupied Serbian territory, the European and world public — even within neutral and allied countries — still showed scepticism and distrust toward these claims (see Subošić and Zec, 2017: 482). On the other hand, in the book that represents a kind of his wartime diary — *What I Saw and Lived Through in the Great Days* — which he dedicated “to those who did not return” from the First World War, this Swiss scholar himself explained the reasons why he accepted the invitation of the Serbian government immediately and without objection: first, because such an investigation fell within his professional expertise, and second, because it offered a clear opportunity to provide his services to the Allies (Reiss, 2014: 19–20).

Based on Reiss’s assessment, it was established that there were around 4,000 Serbian victims in the Mačva and Podrinje regions in 1914 alone (Milić, 2010: 9). In that “monstrous campaign of the Austro-Hungarian army... the Catholic and Germanic Vienna revealed its intentions and aims. Filled with racial and religious hatred, and driven by the idea that ‘Serbia must perish’ — *Serbien muss sterben* — the Austrians, together with soldiers of other nations within their ranks, committed unprecedented atrocities” (Reiss, n.d.: 3).⁵ In the Preface to the London edition (1916) of Reiss’s report submitted

3 Professor Reiss taught photography and forensic photography at the University of Lausanne. In addition to the application of photography in the judiciary and criminology, he was also engaged in its use in medicine. For more on the life and work of Dr Archibald Reiss, see: “Arčibald Rajs” (n.d.), entry in srpskaenciklopedija.org; “Reiss, Rudolph Archibald” (n.d.), entry in encyclopedia.com; Trifković, 2011; *Politika*, August 9, 1929: 1.

4 The heart of Dr Reiss, which had been kept in an urn on Kajmakčalan, has disappeared. As the chapel where it was placed was heavily damaged during the Second World War by the Bulgarian army, it is believed that Reiss’s “golden heart” — as the words engraved on the urn read — was taken away or destroyed by Bulgarian soldiers at that time, as an act of revenge for their defeat at Kajmakčalan in September 1916, but also because of Reiss’s irrefutable evidence of the war crimes committed by the Bulgarian army during the Great War. For more on this, see: Mladenović, n.d.; *Novosti*, August 7, 2010.

5 Thus begins the text titled “*Instead of a Preface*”, published together with segments of Reiss’s report in the book *Austro-Hungarian Atrocities*, issued by the Holy Trinity Monastery near Ovčar (available at <http://www.zlocininadsrbima.com/PDF/Arcibald-Rajs-Austrougarska-zverstva.pdf>). It states that the entire report by Reiss, translated initially in the eponymous



to the Serbian government, reference is made to the “barbaric methods of warfare” employed by the German army and its “cruelty toward civilian populations” in the occupied countries, concluding that, based on Reiss's findings and evidence, the Austro-Hungarian army had surpassed even the Germans in its crimes against the Serbs: “These investigations and the report of a distinguished scholar... actually prove that the ‘pleasant Austrian people’ and the ‘proud and chivalrous Hungarian race’ had the inglorious distinction of exceeding in bestiality, if that is even possible, their Prussian friends” (Reiss, n.d.: 5). The crimes of the Austro-Hungarian army reported and documented by Reiss covered a wide range of atrocities: from deportations, executions, and hanging of civilians, to the burning of villages, the destruction of crops, the killing of the wounded and prisoners, the use of prohibited munitions, and acts of plunder and destruction of both private and state property, including cultural heritage and religious sites (see Subošić and Zec, 2017: 481–482). Reiss's investigations clearly demonstrated that these crimes were not incidental results of wartime operations, but were premeditated acts, part of the Austro-Hungarian “punitive expedition”. According to specific interpretations, such conduct was the product of the dominance of the so-called wartime faction in Vienna, which even before launching its aggression against Serbia advocated a preventive war to secure the survival of the Dual Monarchy and its influence and position in the Balkans — a policy that also suited German militarists and their *Drang nach Osten* strategy (Subošić and Zec, 2017: 479).

Although trained as a doctor of chemistry, Reiss became a globally renowned and respected expert in forensic science and criminology. His scholarly and professional contributions to these fields are indisputable. At the University of Lausanne, he was a professor of forensic photography and co-founder and editor of the Swiss photography journal, *Revue Suisse de Photographie*. He was also the founder and director of the Institute of Scientific Police (*Institut de Police Scientifique*), the world's first institute of its kind, which today, under the name School of Criminal Sciences (*École des Sciences Criminelles*), remains one of the world's most prestigious forensic institutions (“Reiss, Rudolph Archibald,” n.d., encyclopedia.com). Reiss is even regarded as the “founding father of scientific police studies,” oriented toward scientifically based police techniques and the adoption and integration of technological innovations in this field (Krstić-Mistridželović, 2019). The development of this new scientific discipline enabled the establishment of modern policing. In post-war Serbia, Reiss contributed not only to improving the criminal justice system and training Serbian forensic experts but also to establishing forensic science as a distinct discipline, as well as to the building and development of police education and the reform and modernization of police services (see Lazarević and Kolarski, 2023: 48–49; Krivokapić and Ristović, 2002: 117–126; Krstić-Mistridželović, 2011: 165–172; Milošević, 2021: 91–104).

Reiss's extensive experience and knowledge in the aforementioned fields undoubtedly contributed to his successful efforts in proving the crimes committed against the Serbian people and army — not only those perpetrated by the Austro-Hungarians, but also those carried out by the German and Bulgarian armies during the Great War (videti Pršić, ed., 2019). For instance, by pointing to the atrocities that the Bulgarians committed against Serbian civilians and soldiers, and to their treatment of Serbian prisoners of war (providing the information that 18,000 of them were killed near Prilep during the retreat of the Serbian army, and that only 50,000 of the 100,000 Serbs taken to Bulgarian camps ever returned), Reiss proved their violation of international conventions on prisoners of war (Milić, 2010: 10).

Professor Reiss, however, was also a publicist and war correspondent who reported for Swiss, French, and Dutch daily newspapers, while his texts were published in French, English, and German. It is recorded that during the war, he published several books and approximately 800 articles about the Serbs (Reiss, n.d.: 4; Milić, 2010: 7; “Arčibald Rajs,” n.d., srpskaenciklopedija.org). This, along with his dedicated, highly professional, and objective work based on credible investigations, contributed

book published by Dečje novine from Gornji Milanovac (1995), represents “valuable evidentiary material on the genocide committed against the Serbian people in Mačva and Podrinje at the end of the summer of 1914” (Reiss, n.d.: 5).



to ensuring that the truth about the suffering of the Serbs in the Great War reached the European and global public. Thus, Professor Reiss has been remembered among the Serbian people and beyond as a “soldier of justice, truth, and law”.⁶

Reiss, however, did not write only about the crimes of the occupying forces. His thematic scope was much broader. In this way, Reiss conveyed his other insights about the Serbian people — their history, values, and traits, as well as their national aspirations — while a matter of particular importance was his explanation of Serbia’s war aims. This significantly strengthened his contribution to the (re) positioning of Serbia and the Serbian people in the international arena, to the transformation of their previously largely negative image, and to the building of their reputation. This has been confirmed by the results of a more recent study (Subošić and Zec, 2017), based on an in-depth analysis of Reiss’s reports, which demonstrated their influence on reshaping media portrayals of Serbia and the Serbian people in Western European countries. The conclusion reached was that “Reiss became one of the most important and most reliable links between Serbia and international public opinion” (495).

Namely, the previously negative image of Serbia and the Serbs relied on stereotypes that emerged from the pre-war smear campaign — driven by the geopolitical interests of the great powers, primarily Austria-Hungary itself — which escalated on the eve of the Sarajevo assassination in 1914.⁷ This was further reinforced by Austro-Hungarian war propaganda portraying Serbs as “barbarians” and “savages,” prone to plunder and murder. Such an image, constructed with the help of the Vatican, was disseminated by Austrian, German, and Bulgarian press, as well as by “indoctrinated Austrian officers” themselves (Reiss, n. d.: 4). In contrast, Archibald Reiss proved, based on testimonies collected from both Austrian and Serbian soldiers and prisoners of war, that the Serbs truly fought chivalrously, honorably, and heroically.

To emphasize the immeasurable importance of Reiss’s work during the war and his merits in improving the position of Serbia and the Serbian people internationally, it is often said and written in our country that “this brave and fearless humanist — ‘a soldier of justice, truth, and law’ — was worth more to our homeland than a whole division of soldiers on the battlefield” (Milić, 2010: 7).

In addition to everything already mentioned, it should also be noted that Reiss, as a Serbian volunteer in the Morava Division and a Salonika Front fighter, received the status of honorary captain of the Serbian army in 1926, and that he was a member of the Yugoslav delegation at the Paris Peace Conference in 1919 (“Arčibald Rajs” n. d., srpskaenciklopedija.org; Trifković, 2011). Professor Reiss, having numerous contacts both among distinguished people at home and abroad and among ordinary people in Serbia, certainly played a role in the development of cultural and social life in the country in the post-war period, as well as in the development of humanitarian work, since he helped secure education for Serbian war orphans in Geneva (Novosti 2010, August 7), and participated in the founding of the Red Cross of Serbia. It is also considered that Professor Reiss, through his role as a “criminologist-diplomat” contributed to the improvement and development of relations between Serbia and Switzerland in various fields (videti Lazarević and Kolarski, 2023: 39–51).

6 On the monument to Dr Archibald Reiss in Topčider Park in Belgrade, among other inscriptions, the following words are engraved: “To the soldier of justice, truth, and right.” The monument, unveiled on August 9, 1931, was erected by the Association of Reserve Officers and Warriors in gratitude to their wartime comrade and friend of the Serbian people in their darkest days. The sculpture was created by the sculptor Marko Brežanin (Politika, August 9, 2023). It is noteworthy that this monument is included on the list of cultural monuments of Serbia and is designated as an immovable cultural heritage site (Vujanović, 2023: 117).

7 This refers to the anti-Serbian propaganda initiated by Austria-Hungary even before and during the Balkan Wars, which intensified particularly after the First Balkan War, accompanied by narratives about alleged “war crimes” committed by the Serbian army in the liberated territories, and accusations of “extermination of the Albanian people”. The goal was to discredit Serbia, as its strengthening and territorial expansion did not align with the interests of the Austro-Hungarian Empire. For more on this, see: Subošić and Zec, 2017: 479–480.



There are, however, some additional contributions by Reiss in areas that have until recently mainly remained outside the focus of attention when assessing the importance of his work in Serbia, i.e., in the Kingdom of Serbs, Croats, and Slovenes. For example, his studies of Serbian and Yugoslav interwar society hold significant importance in the field of sociological research — not only regarding issues in general sociology (such as social stratification), but also within specific branches of sociology or applied sociologies, which, in addition to criminology, include the sociology of elites, the sociology of education, the sociology of religion, and political sociology (Šuvaković, 2025: 17–43). Likewise — and this is something particularly overlooked by contemporary researchers — Reiss, through his characterology of the Serbian people in the work *Čujte, Srbi!* (*Listen, Serbs!*), made a highly significant contribution to the field of ethnopsychology and the increasingly popular studies of national identity; while, as will be shown further in this paper, in the field of studying Serbian national identity, his role is truly invaluable. By considering Reiss's entire oeuvre, his life and work, it becomes clear that all those contributions discussed here — across various domains of activity of this great man and scholar — were grounded in “a just reasoning of the events of his time, a sincere approach to his work, high moral qualities, a humanistic soul, an altruistic character, and philanthropic activity” (Lazarević and Kolarski, 2023: 41).

Here, however, the primary aim is to emphasise the significance of Reiss's model, which is grounded in his analysis of the key — or, we might even say, typical — characteristics, i.e., traits of the Serbian people as elements of their identity. This model, which precisely and systematically identifies both the positive sides — or, using Reiss's terminology, virtues — and the negative characteristics, i.e., flaws, outlining the two sides or two faces — indeed, the face and the reverse — of the Serbian mentality and national spirit, provides a reliable analytical framework — confirmed over time, as shown by some recent empirical research — for studying the strengths and weaknesses of Serbian national identity. Based on that model, and utilising modern analytical methods and techniques such as SWOT analysis, it becomes possible to establish a strategic foundation for a new and serious identity policy in contemporary Serbia. In this sense, Reiss's study serves as an actual guidepost in the development and redesign of the Serbian national identity. We believe that this approach would also constitute an innovative way to examine the contributions of Dr Archibald Reiss and his multifaceted, far-reaching role in the modernisation and development of the Serbian people, Serbian society as a whole, and the state of Serbia itself.

SWOT ANALYSIS OF THE ELEMENTS OF SERBIAN NATIONAL IDENTITY BASED ON REISS'S CHARACTEROLOGY OF THE SERBIAN PEOPLE

In this part of the paper, based on Reiss's observations and analyses presented in *Ecoutez, Serbes!*—which we have identified as a *sui generis* characterological model—we have sought to identify certain identity elements that represent the strengths and weaknesses of the Serbian national identity, and to categorize them, in accordance with the SWOT methodological technique, as strengths, weaknesses, opportunities, and threats (see Figure 1). In this way, we aim to demonstrate that Reiss's characterology of the Serbian people—or, as we have termed it, the Reiss model—may serve as a practical analytical framework for the application of contemporary methods in the creation of public policies in those areas that relate to identity.





Figure 1: SWOT Analysis of Identity Elements Based on Reiss's Model
(source: Authors' work)

Within the given SWOT analysis, we first identified those characteristics that Reiss viewed as the positive foundations of Serbian identity. When discussing the positive attributes of the Serbian people — categorised here as identity elements that constitute strengths — it must be emphasised that Reiss primarily associated them with the ordinary people, whom he deeply admired for this very reason. Conversely, he believed that among members of the so-called political and intellectual elite, a severe deficit existed in certain value-based and identity-related qualities.

Among the identity elements that constitute the strength of the Serbian people, patriotism holds a foremost position — as a love for the homeland and a sincere, profound sense of belonging, expressed through self-sacrifice in the defence of the country and its freedom. According to Dr Reiss, Serbs are not patriots because they are forced to be by those in power; rather, their patriotism arises from a love of freedom that permeates their entire culture. Serbian patriotism is grounded and inspired by a deep respect and remembrance of national heroes who gave their lives for the freedom of the homeland (see Reiss, 2010: 15). He was most impressed by the patriotism of the so-called common man—the peasant-soldier, the volunteer (see Reiss, 2011). He believed, however, that among the social class known in

Serbia as the “intelligentsia”, patriotism was lacking. Speaking about the Serbian “intelligentsia” during the Great War and its moral decline — criticising its opportunism and cowardice — Reiss wrote:

“...the primary concern of the intelligentsia when the Great War broke out was to secure their own safety... If they could not avoid military service, they would do everything in their power to be stationed in the rear or attached to some commission abroad. Too many university men, ‘intellectuals’ — often reserve officers — sat in the trenches of Geneva, Paris, London, and other places... To justify themselves, they would say that Serbia would need their intellect after the war... A poor excuse... Real people well understand that those who give nothing to their homeland have no rights to it. The pompous ‘intelligentsia’ distinguished itself during the war by cowardice and — what is even worse — some intellectuals used the ordeals of their own people for personal enrichment.” (Reiss, 2010: 39–41)

Despite numerous negative examples — especially among university professors — Reiss did highlight specific praiseworthy examples of intellectual devotion and patriotism, particularly among physicians and grammar school teachers. There is, of course, no shortage of examples of Serbian patriotism, especially during the Great War. One such instance was when, during the Austro-Hungarian offensive, King Peter I the Liberator, learning of the army's exhaustion and despair, stepped among his soldiers and said: “I know you are weary after so many battles, but today — more than ever before — the homeland needs your help. I understand your longing for your loved ones, and therefore I, your King, release you from your oath to me. Go home, but know that I, with my two sons, will remain here to die defending our native soil — and that the enemy shall enter our homeland only over our dead bodies.” (Atlagić, 2011: 403)

Recent research also suggests that citizens of Serbia today consider patriotism an essential characteristic of the Serbian people (over 83% of respondents believe that Serbs are patriotic) (Topalović & Berić, 2023: 58–59). They also largely agree with Reiss's view regarding the deficit of patriotism among members of the political and social elite in Serbia. Nearly 66% of respondents — more than two-thirds of whom are highly educated — agreed with the statement that “many members of the ‘intelligentsia’ would readily sacrifice the freedom and survival of the country if it benefited them personally”; while a significant proportion (75.9%), including many young people, believe that Serbian youth are not prepared to sacrifice for their country (Topalović & Berić, 2023: 61–62).

Nevertheless, experience teaches us — and this was confirmed in more recent Serbian history, e.g., the battles of Košare and Paštrik during the 1999 NATO aggression against Serbia and the FRY — that in times of national peril, patriotism, solidarity, loyalty to the state, and willingness to sacrifice for the defense of the homeland and its freedom emerge strongly among Serbian soldiers and citizens (see Mirović Janković, Ed., 2025). Thus, love of the motherland — described elsewhere as a “religion of the heart” (Atlagić, 2011: 403) — remains a vital component of identity and a developmental strength of the Serbian people and state.

The following characteristics, which form part of the strength of Serbian identity, are courage and heroism. These also represent historical and moral virtues, which are often displayed especially in times of war and adversity. Archibald Reiss wrote with deep emotion about the bravery of the Serbian people in the First World War. His depictions are simultaneously testimony, analysis, and the personal sentiment of a man who loved the people whose suffering and resistance he witnessed firsthand. Addressing the Serbs, he wrote:

“Your people are brave, and their courage often rises to heroism. I can say this with full right, for I have watched your soldiers — and they were nothing but the people themselves — in nearly all the battles of the great war of liberation...”

I have seen your wounded... Rarely would a groan or even a sigh escape their lips...” (Reiss, 2010: 15)



Reiss believed that courage was one of the most prominent traits of the Serbian people — and that Serbian courage was defensive in nature, without hatred for the enemy. Modern examples confirming continuity of this identity element include the Serbian “Spartans” of Košare and Paštrik — border guards and other members of Serbian and Yugoslav security forces — whose bravery and chivalry are today compared to the legendary Thermopylae (see Mirović Janković, 2025: 174–182).

However, we must also consider certain limitations that have prevented Serbs from constantly transforming their courage into “organised collective strength” — as noted by Slobodan Jovanović, who connected this issue to the Dinaric dynamism of the Serbian national character:

“The Dinaric type possesses heroism, but also self-overestimation and self-assertiveness, which make him inflexible and resistant to discipline... In Dinaric exploits, there is more energy and momentum than there is planning and organisation. Examples of personal bravery are countless, but the results achieved are in no proportion to the strength expended and the sacrifices endured.” (S. Jovanović, 2005: 38–39)

Yet, for Reiss, Serbian courage was not merely wartime bravery; it was a way of life and a cultural category: “Your peasant is an everyday hero — he does not speak much, but when necessary, he knows how to die for his land.” (Reiss, 2011)

Hospitality, generosity, and nobility are also essential and recognisable identity determinants of the Serbian people, representing a significant source of their developmental strength. These qualities of the Serbian individual are reflected primarily in their openness toward others and in their readiness to help and share, even the little things they possess. Reiss spoke with great respect about mercy and compassion as “beautiful human qualities” that he had the opportunity to observe among Serbian soldiers, even in completely unexpected situations, such as when they would “give the last piece of bread from their pockets” to prisoners from enemy troops (Rajs, 2010: 18). In *Listen, Serbs!* Reiss repeatedly emphasises that the Serbian people are exceptionally hospitable, and that this hospitality is not formal or interest-based, but cordial, natural, sincere, and deeply rooted in tradition. Folk festivities have, among other things, preserved the custom of hosting guests (“the first piece of the Christmas bread is kept for the passerby”) (17). According to Reiss, the Serb does not host people for the sake of “showing off” but because it is a moral and human obligation (see Rajs, 2011). As noted in a contemporary study, Serbs “find greater satisfaction in giving than in receiving, even if they are of modest economic means. This is, traditionally, part of hospitality, openness, and human solidarity in conditions of scarcity — qualities nurtured for centuries” (Đurić, 2007: 89). Hospitality has become a constitutive element of Serbian national culture and its principal character trait. Moreover, as a distinct cultural-social category, it is present in Serbian linguoculture, and thus in the very linguistic personality of Serbs:

“The linguistic expression of the concept of hospitality in the Serbian language is characterised by a multitude of lexical and phraseological units and numerous proverbs that interpret the culture of hospitality. Lexicographic material from the SASA Dictionary, the first and second editions of the Serbian Dictionary from 1818 and 1852, dialectal dictionaries, as well as proverbs from Vuk’s Folk Proverbs (1836), indicate the significant place of hospitality in Serbian traditional culture and show the model of conceptualisation of this cultural-social category in the linguistic cognition of the Serbian linguistic personality. Linguistic units and their semantic interpretations encode the specific features of Serbian linguoculture” (Milosavljević, 2019: 43).

Serbian hospitality, characteristic of both the people and society as a whole, remains highly valued and recognised by foreigners who reside in or visit Serbia today. Yet, according to the findings of the aforementioned study, the citizens of Serbia themselves are also largely aware of this particular trait, given that more than 95% of respondents stated that they agreed with Reiss’s views on this Serbian



characteristic (Topalović and BeriĆ, 2023: 58–59). What is important to note from the perspective of the developmental potential of this identity element is that hospitality is an essential part of the human resources of contemporary Serbia, one that may contribute to redesigning and repositioning the national identity, attracting foreign visitors, foreign students, as well as investment, etc. — all of which are today crucial for building a successful and internationally competitive national brand (see Mirović Janković, 2023: 872–874).

Another quality that may represent a potential strength of the Serbian people and their identity is solidarity and the spirit of community, which becomes particularly evident in moments of crisis and national misfortune. In his political testament to the Serbs, Reiss writes that solidarity is one of the virtues they must preserve to survive as a nation. He warns that solidarity is stronger among the people and weaker among the so-called political elites, and therefore calls upon the Serbs to return to their tradition of unity and mutual assistance continually. Solidarity and the feeling of kinship among the Serbs have their roots in Christianity and the Orthodox faith: “In the feelings of a Serb in Serbia, thanks to the Orthodox religion, it is significant and wonderful that he regards all his compatriots as a kind of kin” (B. Jovanović, 1992: 57).

According to some interpretations, solidarity among Serbs is closely related to a strong sense of equality that developed due to a relatively levelled social structure during the restoration of the modern Serbian state:

“Well-known explanations refer to the sensitivity of Serbs to excessive inequalities in society, especially if they do not arise from differences in work and ability. Interpretations... boil down to the idea that the origin of the feeling of equality and justice is linked to solidarity in joint struggles against foreign rule, that the higher social stratum had been destroyed under foreign empires, and that the modern Serbian state began... from a leveled social structure... (which was — author's note) of relatively modest social standing” (Đurić, 2007: 88).

Elements of identity that contribute to the strength of the Serbian nation also include qualities such as national pride, folk wisdom, and honesty. Reiss highly valued the pride of the Serbian man, seeing it as “respect for one's own personality” and considering such pride without haughtiness to be a trait characteristic exclusively of good people (Rajs, 2010: 18). However, when it comes to national pride and self-respect, it is noticeable that today these qualities have been significantly weakened among members of the Serbian nation — something closely connected with the negatively-framed identity constructs imposed upon them, as discussed earlier.

In *Listen, Serbs!* Reiss singled out the clarity of mind among Serbs: “...you are a clear-minded people,” he says, and adds, “one of the clearest I have seen in my life. You understand quickly and correctly” (18). Professor Reiss openly writes that the Serbian peasant is intelligent in his simplicity, able to distinguish truth from falsehood, being primarily bound to morals and common sense. He emphasises that Serbian folk wisdom is practical rather than theoretical — wisdom that serves life rather than rhetoric. Likewise, he attributed extraordinary value to the honesty of Serbs, particularly the integrity of ordinary people, seeing it as one of the nation's most deeply rooted moral virtues.

There are also qualities that Reiss criticises as flaws in the Serbian people, and which may be viewed as internal weaknesses of the Serbian national identity. Foremost among these are indiscipline and disorganisation, referring to the lack of systematicity, planning, and respect for rules. Reiss observed indiscipline as a societal problem in Serbia, particularly in matters of organisation, wartime conditions, and specific social contexts. His critique was primarily directed toward collective and institutional discipline — or the lack thereof.



Slobodan Jovanović also highlighted the issue of developing self-discipline among Serbs, which he attributed to the Dinaric type of national character and linked to national neglect, primarily in the cultural and educational spheres (see *Novosti*, April 9, 2021; *Pravoslavlje*, June 1, 2008). He therefore emphasized the strong need to develop self-discipline as an integral part of national character — one that would be “freely accepted” out of “free conviction”, rather than imposed — arguing that this can be achieved only through the educational system and through an enhanced role of scientific, academic, and cultural institutions in all spheres of social life (Jovanović, 2005: 38–39; Mirović Janković, 2025: 194). However, the Dinaric psychology of the Serbian people has not always been an inhibiting factor in achieving national goals: “When Slobodan Jovanović presents various historical situations in which the Dinaric psychology (combativeness, rebelliousness, defiance in the face of danger, the ethic of strong will, indiscipline, the sense of justice) was functional and obstructive from the standpoint of national objectives, it is essentially claimed that there exists a collective mental matrix that is useful in some times (defensive wars) and harmful in others” (Avramović, 2020: 55).

Closely related to the absence of (self-)discipline and disorganisation is also the Serbian tendency toward improvisation, as another weakness of the national character. This implies reliance on one’s own resourcefulness rather than on long-term strategies. In many passages of his work, Reiss highlighted this inclination toward improvisation among Serbs, viewing it as one of the key traits of the Serbian character. However, he regarded this trait as a natural consequence of historical circumstances and life under uncertainty, not necessarily as a reflection of chaos or a negative characteristic in itself. This trait has not only been preserved to the present day, but has become visible in nearly all spheres of life and work in contemporary Serbian society. For example, in the area of political practice, a strategic approach is often absent across multiple policy domains, so that policymaking and implementation rarely proceed from well-designed and long-term plans; instead, they take the form of ad hoc actions.

This character trait is also connected to another predisposition among Serbs, which Reiss identified as a flaw — the tendency to work little. He observed two reasons for idleness, or the lack of a work ethic among Serbs. The first reason he linked to historical circumstances and centuries of hardship: “... under Turkish rule even the hardest work profited you very little. Its fruits were taken only by your oppressor. Over the centuries you became accustomed to working only as much as necessary” (Reiss, 2010: 21). The second reason, according to Reiss, lies in the natural wealth of the land: “... your land is so fertile. With very little work you have everything you need for life” (21).

Among the internal weaknesses of Serbian identity, Reiss also included superficiality and forgetfulness. When we speak of Serbian forgetfulness, we primarily refer to the tendency to overlook lessons from the past and easily abandon ideals. However, since the consequences of this collective oblivion and the absence of an adequate politics and culture of remembrance will be analysed in more detail in the chapter on threatening tendencies, here we shall focus on superficiality as a weakness of Serbian identity. In his analysis, Archibald Reiss wrote about the superficiality of Serbs primarily in the context of the social conditions of the time. He did not criticise Serbs for having an inherently poor character in this regard. Instead, he pointed to certain simplified or superficial reactions in specific situations, particularly in culture, education, and administrative affairs. For example, he believed that university education in Serbia at the time was extremely superficial, amounting to “paragraphs learned by heart from books,” so such diplomas were worthless in a professional sense. In this regard, he particularly criticised jurists, noting that when a lawyer with such superficial education enters the administration, “he can only become a poor civil servant” (Reiss, 2010: 21). His point was that the essence of university education should lie in professors conveying lessons to students and acquainting them with proper methods of reasoning.



Envy and disunity, often exhibited in Serbian traits, also fall into the category of identity-related weaknesses. However, Reiss considered these to be individual rather than structural social or national defects. He interpreted them as products of historical difficulties, as well as local conflicts and material inequality. Although Serbs are keenly aware of the negative consequences of their disunity on their survival and ability to achieve goals (reflected in the well-known maxim and slogan of the four Cyrillic S letters — “Only unity saves the Serbs”), and although calls for unity intensify in times of crisis, this trait persistently endures. Reiss also believed that jealousy leads to another flaw — excess or lack of moderation: “You want to equal others, even to surpass them, and you exaggerate in supporting them” (Reiss, 2010: 28). He particularly noted jealousy among the so-called intelligentsia, which in this case correlates with their superficiality: “Your intelligentsia,” Reiss writes, “slavishly follows every whim and absurdity of the so-called modern life, and exaggerates in doing so — whether it be in fashion, painting, sculpture, sport, etc. These people fail to see that they become ridiculous in their effort to reach and surpass others only to satisfy their jealousy” (28).

Finally, but no less importantly, we classify among the identity weaknesses of the Serbian people and society as a whole the phenomena of corruption and the prioritisation of personal interests over the common good, which are seen as consequences of the moral decline of individuals and institutions in relation to the national ideal. Reiss devoted considerable attention to corruption in Serbian society, particularly in politics, as well as to its critique. Moreover, the widespread presence of this phenomenon at all levels of administration and politics (“from the lowest clerk... to the minister”) and its deep-rootedness was one of the reasons for his disappointment in the postwar situation in the Kingdom of SHS (Reiss, 2010: 32). He emphasized that corruption had particularly infected the so-called intelligentsia of Serbia, pointing to numerous examples of high-level corruption — that is, naming poor men who, upon entering politics and becoming deputies or ministers, had suddenly become enormously wealthy. In this context, he believed that the predictions of German Chancellor Bismarck (Otto von Bismarck) had been confirmed; during the Berlin Congress of 1878 he stated: “If in Serbia you meet a man wearing his shirt over his trousers, you may rely on him. He is an honest and decent fellow. But if he tucks his shirt inside his trousers, he becomes a scoundrel” (21). Yet, according to Reiss, bribery had become part of almost any administrative affair in Serbia. For example, “freight wagons often would not depart unless set in motion by a bundle of banknotes... items at customs ... are delayed unless there is an incentive in the form of a tip” (33). Still, Reiss distinguished “bureaucratic” or “administrative” corruption from high-level political corruption. In describing the former, he notes that given their low wages, “these subordinate officials merely follow the example set from above” (59–60). And while he had, if not justification, then at least understanding for that type, he saw political corruption as unacceptable (for it “has no mitigating circumstances”) (34).

Today, Reiss's views on corruption in Serbia are often invoked, his examples of such practices and descriptions of bribery and abuse of office cited to support arguments that such socio-political pathological phenomena remain present in contemporary Serbia. In this sense, it is noteworthy that “in the public sphere his name (Archibald Reiss — authors) is often instrumentalised, and the memory of his character and work is used to point to certain phenomena in Serbian society today or to reinforce arguments about some of our traits” (Vujanović, 2023: 120).

Nevertheless, Reiss emphasised that these phenomena were not reflections of the fundamental moral pattern or the true national character of the Serbs, but rather consequences of complex lives, poverty, and prolonged insecurity. He even explained that corruption among Serbs developed because, driven by the desire for a better life and enrichment without much effort and lacking work habits, they adopted the former Ottoman model. He spoke of this as a “centuries-old notion of Turkish Oriental bribability” (Reiss, 2010: 32).



When, within this SWOT analysis, we speak of opportunities, we mean the possibilities and chances available to Serbia and the Serbian people, arising from the positive potentials of national identity as understood by Archibald Reiss.

First of all, among such opportunities is the necessary renewal of moral values and national consciousness, primarily through education and culture. In other words, the Serbian people would have numerous opportunities if they were to overcome the condition in which they have long found themselves, which Slobodan Jovanović (S. Jovanović, 2005) long ago described as a “national neglect”. In this respect, the system of education and upbringing, as well as cultural institutions, must play a primary role in shaping the future of our society. Yet, in this process today — more than ever before — the role of the media is also significant, especially that of public service broadcasters (see Mirović, 2006: 197–212), for alongside the family, these are crucial channels for transmitting and socialising specific values, thus encouraging their internalisation at the individual-psychological level.

Achieving national unity, that is, overcoming deep divisions and fragmentation by establishing a shared goal and responsibility for the future of the state, would open up major possibilities and new opportunities for development in Serbian society. This implies achieving a national-level consensus regarding fundamental values and objectives, as well as the country’s future development directions.

We have also included in the category of opportunities the development of (self)discipline and the building of institutions that uphold the law and principles of justice. The importance of self-discipline has already been discussed; therefore, we will add that it is a necessary precondition for progress, both individually and socially. The establishment of responsible and efficient institutions grounded in respect for the rule of law and justice, with transparency in their work, is essential not only for institutional integrity itself but also for restoring citizens’ trust in them, which, overall, is at a very low level in Serbia. According to a 2024 study (Demostat), distrust in social and political institutions in Serbia was expressed, on average, by 49% of respondents (while 22% expressed trust). The most significant dissatisfaction with institutional work and results is found in the areas of combating corruption and crime (67% dissatisfied), followed by the judiciary (53%), which has the same level of dissatisfaction as education and schooling (53%) (Mihailović, 2024). Equally interesting are the findings of another study from the same year,⁸ focused solely on young people, according to which political institutions enjoy the lowest level of trust (an average score below 1.5). In contrast, the army (average score 2.82) and the Church (2.6) remain the institutions with the highest trust among youth, the latter being the only institution whose trust levels have increased relative to the same study five years earlier (2019 – 2.4). These are institutions that have traditionally enjoyed high levels of trust among Serbian citizens. It is also noteworthy that young people expressed the highest level of confidence in science and scientific institutions (the only average score above 3 — specifically, 3.15), which were included in the scope of this research for the first time (according to *Danas*, 2024, August 3).

Building trust in institutions also presupposes changing attitudes toward citizens—for example, in institutions of local self-government or social welfare. A low level of trust in social and political institutions inevitably leads to growing distrust in leadership. According to the same research on youth attitudes regarding trust in leaders of key institutions, this category of the population expressed the highest trust in the Serbian Patriarch (average score 2.39) (*Danas*, 2024, August 3).

When discussing opportunities for Serbia and the Serbian people rooted in their cultural identity, it is essential to emphasise the importance of utilising tradition as a foundation for modernisation. This refers to a potentially positive fusion of tradition and spirituality, on the one hand, and progress or modernisation processes, on the other. This must be kept in mind because within Serbian society, there

⁸ This refers to a study whose results were presented in the Alternative Report on the Status and Needs of Youth in Serbia for 2024, published by the National Youth Council of Serbia (KOMs).



is a segment that is radically anti-traditionalist and rejects any form of traditionalism—even one that is neither extreme nor orthodox—as inherently harmful and backward (Mirović, 2008b: 1387–1395; 2008a: 187–210). In doing so, the very concept of tradition—wrongly reduced to an exclusively static, retrograde, and decaying phenomenon, allegedly characterised by non-reflectiveness and irrationality—is often confused with traditionalism, which represents “a kind of ideologization of tradition” (Mirović, 2008b: 1392). In this way, tradition is placed in opposition to (post)modernity, which is attributed exclusively positive traits, such as self-reflexivity, rationality, development, and progressiveness. Yet tradition may be defined as “the totality of established behavioural patterns, moral standards, customs, and values formed in the past and transmitted as cultural heritage to new generations, thereby ensuring the cultural continuity and identity of a people, groups, and individuals” (Kuzmanović, 1998: 260). Theoretical arguments and empirical examples from some developed societies show that tradition and traditional identities need not necessarily stand in opposition to modernization processes; instead, “some traditions possess great vitality precisely due to their self-reflexivity and rationality, which enable them—through a degree of adaptation and change (thus allowing dynamism and developmental ability to be their inherent characteristics)—to endure and survive through time” (Mirović, 2008b: 1390). After all, modernisation without reliance on tradition would lead to an impersonal society with homogenised needs and values, lacking recognisable identity and national specificity.

Furthermore, significant opportunities and development prospects for Serbia and its people depend on building, strengthening, and protecting the country's international reputation. It must be taken into account that the process of creating a state's reputation is long-term, unlike its image — a vital identity category — but one that rests on current perception (see Mirović & Janković, 2023: 867). The construction and redesign of Serbia's contemporary identity, as well as the development of its international reputation, must be based on national specificities and authentic moral, cultural, and other values. Today, only in this manner can the nation be successfully repositioned in the international arena.

Finally, some factors threaten the identity — as well as the moral and broader development — of the Serbian people and society as a whole. Among such tendencies — which, based on some negative characteristics of the Serbian people as understood by Archibald Reiss, we categorise as threats to the survival and further development of the Serbian nation, the preservation of its identity, and the overall progress of society and the Serbian state — foremost is the importation of foreign moral models and associated negative influences. What we are dealing with is an imitative practice — the adoption of foreign value patterns, primarily from Western societies — which are in many respects fundamentally at odds with the traditional value system of Serbian society. A clear example of the consequences of this dynamic can be seen in the acute erosion of the family and education — the fundamental pillars of society. The erosion of the family, which is of paramount importance and — given the continued multi-year decline in the birth rate in Serbia — an existential threat to the Serbian people and society as a whole, is undoubtedly a reflection of the erosion of Orthodox culture and of traditional Christian values in general. Commenting on these negative tendencies in a new phase of neoliberal capitalism, in which “the state is losing its power” and which are increasingly gaining momentum in Serbian society, the celebrated film director Emir Kusturica remarked: “That world which is carrying out these changes with an assaulting force actually wants to change not only our hearts but also our souls, our social being, to practically abolish the freedom we once had, and to bring us to respect laws that undermine Orthodox culture” (Media Center, 2021). This inevitably leads to a moral crisis and a profound identity crisis.

This importation of foreign value models represents nothing other than what, in contemporary political science terminology, could be referred to as value isomorphism. However, in modern Serbia, we are also witnessing institutional isomorphism, which refers to the practice of adopting and simply grafting foreign institutional models and solutions without any adaptation to the domestic socio-his-



torical context — namely, the institutional traditions, specific characteristics such as identity-related conflicts, and the needs of Serbian society itself.⁹

Closely connected to this isomorphic practice in the field of values is another threatening tendency, referred to as moral and cultural decadence, reflected, among other things, in the loss of respect for tradition and spirituality. Archibald Reiss already observed that, although the religion that became part of the people, in the sense of the existence of a “people’s church” and “people’s tradition”, was one of the primary means of survival for the Serbian people. In order to preserve their identity during the difficult times of foreign rule, Serbs are, in fact, not religious in the classical sense of the term. He was referring to ecclesiastical or institutional religiosity. Nevertheless, it is essential to bear in mind that “religiosity differs from religion as a broader concept, since it is an individual attitude, a subjective experience that may even be mystical, and therefore difficult to empirically verify” (Radisavljević Ćiparizović, 2006: 59).¹⁰

Interestingly, Reiss perceived even at that time that the lack of classical religiosity was characteristic primarily of the male population in Serbia (within the Kingdom of SCS): “You will hardly ever find men in church. How many times have I entered your temples at the time of service and found only a few rare believers there, almost exclusively women” (Reiss, 2010: 17). This observation by Reiss corresponds to the view of his contemporary—Bishop Nikolaj Velimirović—who noted that, at that time, European culture still “had not corrupted the women here. The Serbian woman,” — said Saint Nikolaj of Ohrid and Žiča (canonised in 2003)— “is an ascetic, a woman of prayer, a saint, risen to the heavens” (Tucić, 2023).

Indeed, in the postwar period, during socialist Yugoslavia, when the suppression of Serbian cultural and national identity was at its height, it turned out that it was Serbian women who, often in secret, baptised children, preserved customs related to religious holidays, and in this way maintained, within their families, at least some connection with Orthodoxy and the Church. Some later studies also showed that during the 1980s, the average believer came primarily from the ranks of women and the older segment of the population (Đorđević, 1990). From the late 1980s onward — and especially after the disintegration of the second Yugoslavia — there was a revitalisation of religious identity and a rapid increase in religiosity, or at least its external manifestation, throughout the territory of the former common state. Whether this occurred due to the prolonged suppression of religious traditions or as an instrument of homogenization and mobilisation of newly formed — or restored — nations is another matter (see Radeljić and Topić, 2015). This trend was also recorded in Serbia.

However, although there was a dramatic rise in those who, based on religious self-identification, categorize themselves as believers — with a simultaneous drastic decrease in non-religious persons in the general population — research at the end of the last decade of the 20th century shows that among traditional forms of relationship toward religion and the Church, the most prevalent were the baptism of children, church rites, and the celebration of religious holidays and the *slava*. By contrast, when it comes to other forms of religious behavior (so-called actual religiosity), such as the practice of prayer and fasting — and especially church attendance and participation in liturgy — as well as reading reli-

9 For more on institutional isomorphism and its various types, see: DiMaggio and Powell, 1983: 150–154. On the widespread isomorphic practice in Serbia — not only in the institutional and value spheres but also in the scientific field — see: Mirović Janković, 2023: 189.

10 When it comes to the quality and intensity of people’s religiosity, theology has long used various descriptive terms to denote different types, such as “zealous”, “nominal”, “marginal”, “lukewarm”, “drowsy”, “seasonal believers”, “folklore conformists” or “non-practitioners” etc. (Jukić, 1973, according to Radisavljević Ćiparizović, 2006: 59). In contemporary research within the sociology of religion, the following categories, for example, are also used to determine and measure the intensity or degree of religiosity: “convinced believer”, “non-denominational believer”, “doubtful”, “indifferent”, “non-religiously tolerant”, and “antitheist” (see Radisavljević Ćiparizović, 2006: 115).

gious literature, their prevalence is much lower among members of Serbian society, even among those categorized as “convinced believers” (see Radisavljević Ćiparizović, 2006: 65–95, 115).

Partisanism¹¹ and political corruption are yet another set of characteristic — but also threatening — phenomena in Serbian society. Such phenomena were already strongly present in the period of Reiss's stay in postwar Serbia. Partisanism, in the sense described by Reiss, refers to party fanaticism and the pursuit of narrow party interests that often serve to mask personal interests, all at the expense of citizens and the broader national interest. Partisanism is to a great extent based on a form of cronyism that involves allocating positions according to party affiliation. Yet, other forms of cronyism are also present in Serbia, where obtaining a position often depends on friendly or school connections, god-parent ties, and the so-called bureaucratic relations, which involve belonging to the same generation or certain Masonic or other lodges (see Šuvaković, 2025: 36–37).

Although discussions on the nature and causes of this phenomenon are possible —whether it is a character trait or part of the national mentality, as Reiss believed, or instead connected to the nature of particular political parties and their policies — the fact remains that it produces several negative implications for the development of society and the state (36). The foremost bearers and promoters of this practice are “party-politicians”, whose primary motive for political activity is personal gain — that is, whose party fervour is driven solely by lucrative reasons (25). Reiss thus distinguished these “party-politicians” from “statesmen-politicians”—those guided exclusively by what they believe is good for the state and who would have the strength to oppose narrow party interests in favour of general or state interests.

Partisanism is fertile ground for political corruption. Speaking about the prevention of detection and punishment of corruption in Serbia, Reiss noted the presence of partisan networking — even among political opponents, that is, different and opposing parties — for mutual protection:

“Then your party-politicians would establish parliamentary inquiry commissions, which never produced any results, because wolves do not eat wolves. Various political parties would insult each other for their own advertisement. Still, they were cautious not to dig too deep, since they knew well that corruption is not the prerogative of one party, but of all of them” (Reiss, 2010: 59).

We have already discussed Reiss's understanding of corruption — its nature and its conditioning by the socio-historical development of the Serbian people — in the section on the weaknesses of Serbian identity. What should be emphasised here is the current perception of corruption in Serbia, which demonstrates the validity of Reiss's assessment of corruption as one of the main “ailments” of Serbian society. According to data for 2022 provided by Transparency International (i.e., Transparency Serbia), based on the Corruption Perceptions Index (CPI), Serbia is, along with Albania, the worst ranked country on the European list (which includes EU member states and regional non-members); while on the global list it ranked 101st (out of 180 countries) (Topalović and BeriĆ, 2023: 64; Vujanović, 2023: 119).

Yet another, and perhaps the greatest threat to Serbian society and the Serbian people is their fragmentation and division along political, ideological, and identity lines — so deep that national unity itself has become endangered. To the old symbolic divisions (such as those related to dynastic conflicts or divisions between monarchists and republicans, Chetniks and Partisans, etc.), new ones have been added, which are, in essence, predominantly identity-based. They generate deep social cleavages along

11 It is essential here to make a terminological note regarding the concept of *strančarenje* (party factionalism), which in the Serbian language is actually used as a synonym for partisanship (in the sense of fervent supporters of political parties or currents), since this latter term, although used in earlier times, is nowadays avoided because of possible terminological and conceptual confusion with the similarly named fighters of the communist anti-fascist movement. For more on this, as well as on the origin of this Reiss's term, see: Šuvaković, 2025: 46.



various axes or lines of division: from those concerning the type of identity model that is accepted and promoted — civic vs. ethnic; to divisions between traditionalists and modernists; to divisions along the majority vs. minority identity line, or in general based on conflicts among different particular identities; and finally to divisions based on identity orientation toward the outside world (see Mirović, 2008a: 187–210, 2008b: 1383–1428; Mirović Janković, 2023: 476–477). Such divisions prevent the establishment of any consensus regarding fundamental social values, common goals, and the strategic directions of national development.

Equally significant is a threat stemming from the current tendency of the Serbian people to forget their historical sacrifices and ideals of freedom, which may lead to the loss of identity continuity. One of the very virtues of the Serbian people, particularly admired by Archibald Reiss, who recognised an essential source of their patriotism and which he spoke about with great personal respect as a “magnificent gift”, was the people’s vivid remembrance of legendary national heroes:

“I do not know of any other nation in which legendary national heroes live so deeply in the soul of the people as among you. And you have that magnificent gift that the memory of these heroes can inspire you so greatly that your own life no longer means anything to you. It is because the image of those legendary heroes comes forth from your very selves” (Reiss, 2010: 15).

However, in contemporary Serbia, this virtue is diminishing. It is enough to recall once again our heroes from Košare who, guided precisely by the national ideal of freedom, showed extraordinary sacrifice and personal heroism in defending the country and its people — and who, long after the 1999 war, essentially throughout the following decade and a half, just like the very topic of the Battle of Košare itself, despite being one of the most significant battles in modern Serbian history, were subjected to “deafening silence,” remaining outside the realm of public discourse or remembrance of any kind (see Mirović Janković, 2025).

A similar attitude of the state existed toward those who “bled for the liberation of the country” after the First World War and after the war of 1999. When it comes to the participants in the latter war, it may be said that they fared even worse, “because in Reiss’s time there was no so-called Hague Tribunal to put King Peter, Regent Alexander, and Serbian *vojvodas* on trial for the crime of defending their country — while today that ‘institution’ has fulfilled its purpose by convicting the entire Serbian political, military, and police leadership from the period 1990–2000, while acquitting even the direct perpetrators of crimes against Serbs...” (Šuvaković, 2025: 35).

However, the practice of “forgetfulness” is often present when it comes to other historical events as well, both from our recent and more distant past. Particularly illustrative are the experiences with attempts by certain global and regional media, as well as other public actors and even some scholars, to engage in historical revisionism and instrumentalise the commemoration of events such as the Great War for day-to-day political and propagandistic purposes. That war represents the brightest military tradition of the Serbian people, who at that time made immense sacrifices (see Milošević & Mirović Janković, 2020: 172–219). Dr Dušan Milić, retired colonel, in the preface to one of the editions of Archibald Reiss’s *Listen, Serbs!*, criticising the political concept of so-called “facing the past” that has for decades been imposed on the Serbian people, wrote:

“To avoid new enslavement in the 21st century, the Serbian people must confront everything they experienced during the First World War, for that is their true past, representing the brightest part of their history. Among all the Allied countries of the Entente, Serbia suffered by far the greatest losses, from which even those who attack it today greatly benefited... Just as we must not forget the messages left to us in this unique testament by our proven friend (Archibald Reiss – author’s note), Serbia can never forget the suffering of its people and army during the First



World War. In this war, Serbia lost 30% of its population, of whom 54% were between 18 and 55 years of age – that is, the reproductive segment” (Milić, 2010: 5, 9).

Archibald Reiss was a direct witness to this terrible suffering of the Serbian people, and it was on this basis that he was able to inform the world public about all the atrocities and crimes committed against Serbs by the Austro-Hungarian, German, and Bulgarian armies. All of these points lead to the conclusion that there is a pressing need to revitalise and further institutionalise the culture of remembrance in Serbia today. During the commemoration of the 82nd anniversary of the death of “one of the greatest Serbs” in 2011, the following was noted, among other things:

“The identical nature of the facts listed by Reiss in his book written in 1928 (*Listen, Serbs!* – author's note) and the current socio-political situation is astonishing. It is devastating that, over the course of eight decades, the situation has not improved, and I dare say it has actually worsened. It appears that the stratum of people whom Reiss refers to as the so-called intelligentsia has undergone several generations of mutation, reaching its peak in the 21st century... Unfortunately, it seems that the disease Reiss spoke of has penetrated deeply and, rooted in this society, has begun to metastasise. The heroes never regained the strength and energy lost in wars, but the so-called intelligentsia has expanded to unimaginable proportions.” (Trifković, 2011).

We may also add that this trend has continued, and even on the eve of the centenary of Reiss's political testament to the Serbs, there has been no progress in overcoming the weaknesses of Serbian society or eliminating the threatening tendencies based on them. This is confirmed by the results of the aforementioned research (Topalović and Berić, 2023), according to which a significant share of respondents agreed with most of Reiss's views and claims about the characteristics of Serbian society — particularly the negative ones, such as the lack of patriotism among the political and social elite, the corruption and inefficiency of political institutions, partisanship, problems in education, and so forth. An important conclusion reached by the authors of this study is that, “despite clear indications that Reiss's observations and assertions about the flaws of the Serbian people persist to this day, it is encouraging that the people are aware of them” (72). In other words, there is hope in the fact that, as with any problem or deficiency, awareness of them is a necessary precondition for their overcoming. However, it is disappointing to note that some experts devoted to the study of Dr Reiss's oeuvre, as well as those well acquainted with his life and work, claim that this great man — who, as the verses of Vojislav Ilić the Younger say, “gave to beloved Serbia his dreams, his youth, and his whole life” — “is insufficiently visible in Serbian public life, and that the vast majority know only that he wrote *Listen, Serbs!*” (Vujanović, 2023: 117). Simply put, the thematisation of Dr Reiss's life, his role, and his manifold contributions in various fields of Serbian society and state development is insufficiently represented in both media content and the education system. These assessments are further confirmed by the findings of another recent study (Spasojević and Matijević, 2023), at least when it comes to today's youth in Serbia — specifically, the segment belonging to the university community (the research sample included students of the University of Belgrade) — which revealed a low level of familiarity with the figure and work of Professor Reiss, as well as with his importance for Serbia (93–102).

The analysis presented above demonstrates the continued relevance, value, and utility of Reiss's model as an analytical instrument even today. It undoubtedly offers a conceptual framework for better self-perception as a people, providing a strong impetus for critical self-examination to realise the full potential and developmental capacities that we, as a nation, undoubtedly possess. In this sense, another warning left to us by Reiss is worth recalling: “With your intelligence (meaning mental sharpness – author's note) and the natural wealth of your land, you ought to have one of the leading roles in Europe. Your flaws, especially the flaws of those whom you call your ‘intelligentsia,’ prevent you from achieving this” (Reiss, 2010: 18).



Translated into the language of contemporary science and expertise, the human and natural resources Reiss referred to are not lacking; indeed, they constitute some of the key comparative advantages of modern Serbia and the Serbian people. We must make the best possible use of them, while simultaneously overcoming our weaknesses and shortcomings, if we wish to be competitive and better positioned in the external environment. This is, of course, what is today referred to as the strategic management of national identity (see Mirović Janković, 2023: 865–895).

CONCLUSION

The SWOT analysis of the identity elements of the Serbian people presented in this paper, based on Reiss's observations — what we have termed Reiss's characterological model — shows that Serbian identity is rich in noble and heroic traits but also burdened with internal flaws that hinder social progress and the full use of our own developmental potential. Reiss urged the Serbs to return to their best virtues — honesty, unity, and solidarity, as well as love of truth and justice, and love of the homeland — and through them to restore their moral and national integrity.

His message still carries great significance today: the strength of a people lies in its morality, and the preservation of identity requires constant self-examination, self-criticism, education, and responsibility — both toward one's own tradition and toward one's future.

If we were to restore and preserve what is best within us, grounded in the brightest Serbian traditions, safeguarding all those values that belong to the category of excellence and to our national authenticity, while at the same time overcoming our deficiencies and weaknesses, we could undoubtedly develop and enhance our not-so-small capacities, seize numerous opportunities, and eliminate threatening tendencies.

This would mean that we have finally understood — and, more importantly, acted constructively upon — Reiss's famous warning that our destiny depends primarily on ourselves: "Despite everything, I believe in the future of your people. The spirit of Kosovo, Karađorđe, Kumanovo, and Kajmakčalan will awaken again. Yet it must awaken quickly, for without it you may once more experience a time of enslavement... Your destiny lies in your own hands: a bright future or renewed servitude." (Reiss, 2010: 90).

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TECHNOLOGICALLY FACILITATED VIOLENCE: CRIMINOLOGICAL ASPECTS OF TECHNOLOGY ABUSE IN FAMILY AND INTIMATE RELATIONSHIPS

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ABSTRACT

Purpose: The purpose of this paper is to analyze the growing phenomenon of technologically facilitated violence (TFV) in the context of family and intimate partner relationships. Technology has slowly penetrated every pore of social life, so no matter how much it facilitates everyday life, it inevitably becomes an integral part of human deviant behavior. The study aims to discover how digital tools are used to exercise psychological, emotional, and coercive control over victims and to explore the criminological implications of this new form of abuse. Technology can leave room for new forms of violence but also help in carrying out existing ones. Therefore, the main goal is to investigate new trends in the abuse of technological and digital opportunities in this direction. A special focus will be placed on the Republic of North Macedonia, the emerging forms, cases, and legal amendments that will be considered to determine the extent to which they offer protection from this phenomenon.

Design/Methods/Approach: The research employs a qualitative criminological approach supported by legal analysis. It draws on secondary data from academic literature, international documents, and reports, alongside selected case studies and statistics from national stakeholders. Macedonian criminal law is critically examined to identify legislative gaps, while practices from developed countries and trends are reviewed as models for reform.

Findings: The study identifies several key forms of technology abuse in intimate settings, including cyberstalking, online tracking, control via social media or smart home devices, etc. It highlights how these acts often remain invisible to traditional legal definitions of violence and are frequently underreported. The paper finds that existing criminal law provisions in North Macedonia offer limited direct protection against TFV and that there is an urgent need for digital-specific legal mechanisms, institutional training, and cross-sectoral coordination.

Originality/Value: This paper contributes to the limited regional scholarship on technology-facilitated domestic abuse by providing a criminological lens to a globally emerging issue. It emphasizes the importance of recognizing digital abuse as a legitimate and serious form of victimization and offers evidence-based recommendations for legal and institutional reform, especially in the context of harmonizing national legislation.

Keywords: Technology-facilitated violence, intimate partner abuse, cyberstalking, criminology, gender-based violence, North Macedonia, domestic violence.

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INTRODUCTION: ABOUT THE TECHNOLOGICALLY FACILITATED VIOLENCE

In the twenty-first century, the penetration of technology into all aspects of human life has transformed the landscape of social interaction. From online communication to smart home devices, digital technology has blurred the boundaries between the private and public spheres. Digitalisation affects most fields of criminology, from financial crime and enabling new forms of identification, but also ID theft, to social media that enable social networks that have a preventive effect on their members, but also propaganda, radicalisation and ‘networked hate’ (Kaufmann & Lomell, 2025, p. 9). One way that criminology can account for the enabling and disabling effects of technologies is to conceptualise crime, deviance, and justice as increasingly techno-social practices within a digital society (Stratton, Powell, & Cameron, 2017, p. 24). Studying digital dimensions of crime is not the same as studying cybercrime. Cybercrime is often used as an umbrella term that includes all offences occurring in or being facilitated by an online environment. Research on cybercrime is well-established in the field of criminology. Digital criminology underlines that a study of online crime would take offline, analogue, or other aspects that enable criminal practice into account. Since digitalisation is a process of constant change, definitions as to what counts as crime and what is criminalised and in need of regulation are under constant development, too (Kaufmann & Lomell, 2025).

With the rapid development of the internet and technological devices, despite their enormous benefits for everyday life, multiple questions about human rights endangerment and security challenges have been raised as inevitable. In that regard, technology-facilitated abuse is often described as the misuse or repurposing of digital systems to harass, coerce, or abuse, involving both existing and emerging technologies (Koukopoulos, Janickyj, & Tanczer, 2025). The UN Special Rapporteur on violence against women in 2018 defined technology-facilitated gender-based violence as any act of gender-based violence against women that is committed, assisted, or aggravated in part or fully by the use of ICT, such as mobile phones and smartphones, the Internet, social media platforms, or email, against a woman because she is a woman, or affects women disproportionately (UNDP, 2018). It is regularly discussed in the context of domestic abuse, where it is perpetrated via a range of systems, including personal electronic devices (phones, laptops, and tablets) and smart home/Internet of Things appliances, as well as online accounts that are either shared or accessed without the partner’s consent (Tanczer, Parkin, & López-Neira, 2021). According to UN Women and the World Health Organization, technology-facilitated violence against women (as the most common domestic violence victim) is any act that is committed, assisted, aggravated, or amplified by the use of information and communications technologies (ICTs)² or other digital tools that results in or is likely to result in physical, sexual, psychological, social,

2 ‘ICT’ is described as an umbrella term that includes mobile phones, the Internet, social media platforms, computer



political, or economic harm or other infringements of rights and freedoms (UN Women; World Health Organization, 2023). In their research, they are stressing that perpetrators of technology-facilitated violence against women (TF VAW) use a variety of technology-based tactics to enact harm, and while some are unique to digital contexts (doxing, gender trolling, hacking, cybergrooming, using fake accounts, and image-based abuse), TF VAW also includes behaviours that are not unique to digital contexts (harassment, stalking, and exploitation) but may be assisted, aggravated, or amplified by the use of ICTs or other digital tools. Those who are at greater risk of experiencing this behaviour within a family and/or intimate relationship are women and LGBTIQ+ people (Australian Government, eSafety Commissioner, 2023). Although both genders can find themselves in a situation of victimisation, here, as in violence between family members and intimate partners, the women are more vulnerable and more frequently in a position to become a victim (Vogels, 2021). Migrant women, women in religious, rural, or remote areas, and women with disability, are often seen as a group that may experience elevated risk of such victimisation (MacDonald, Truong, Willoughby, & March, 2023).

Digital violence against women is gender-based violence that occurs directly or indirectly through information and communication technologies and that results in, or is likely to result in, physical, sexual, psychological, or economic harm or suffering to women and girls, including threats of such acts, whether occurring in public or private life, or violations of their fundamental rights and freedoms. This violence against women is not limited to, but includes invasions of privacy, stalking, harassment, gender-based hate speech, sharing of personal content without consent, sexual abuse based on images, hacking, identity theft, and direct violence. It is part of a continuum of violence against women: it does not exist in a vacuum; instead, it stems from and supports many forms of offline violence (Advisory Committee on Equal Opportunities for Women and Men, 2020). Although more research is needed to fully understand the phenomenon and its impacts, current knowledge points to the fact that they are very similar to other types of violence against women: they are driven by the same reasons: misogyny, sexism, and male domination (Advisory Committee on Equal Opportunities for Women and Men, 2020). Therefore, in the paper below, the focus will be on women as victims of violence in the family and intimate relationships facilitated by technological devices.

The Technology Facilitates Violence Against Women in Domestic and Intimate Relationships

Digital gender violence is spreading uncontrollably, from the harassment of women who are public figures on social media to the tracking of intimate partners using dedicated applications. In the digital age, violence against women has transcended physical boundaries and entered the virtual sphere, creating new and complex patterns of harm. The growing integration of digital technologies into everyday life has not only reshaped communication, intimacy, and privacy but has also expanded the tools available for abuse. Within criminological discourse, this phenomenon, conceptualised as *technologically facilitated violence against women*, covers a multifaceted form of gender-based violence perpetrated through or assisted by digital means. It encompasses a wide range of behaviours, from online harassment and surveillance to the non-consensual dissemination of intimate images and financial control through digital platforms. Different types of perpetrators can commit such violent behaviours. They might be relatives or acquaintances of the victim, (ex-) intimate partners using digital devices to track and control their victims, classmates, co-workers, or anonymous users or online criminals like impersonators and hackers (Advisory Committee on Equal Opportunities for Women and Men, 2020).

Technology is not neutral. It mirrors existing gender inequalities and amplifies the reach and impact of abuse. In this sense, technologically facilitated violence against women represents both an evolu-

games, text messaging, email, and other related technologies.



tion and a continuation of patriarchal control, demanding equally adaptive legal and criminological responses. Gender-based violence in digital space includes various forms of deviant and/or criminal behaviour, such as online hate speech (mostly misogynistic), cyberstalking, online sexual harassment, other forms of cyber harassment, cyberbullying, image-based sexual abuse, and other forms (Stanojaska, 2025). The following section examines these divisions and their criminological implications, highlighting how each subforum reveals a distinct yet interconnected mode of digital victimisation.

In criminological analysis, researchers typically identify several main divisions of technologically facilitated violence, each representing distinct manifestations of abuse. These include the following:

Technology-facilitated coercive control (TFCC), which focuses on the use of digital tools to exercise dominance and surveillance within intimate relationships. Technology-facilitated coercive control (TFCC) focuses on the use of digital tools to exercise dominance and surveillance within intimate relationships. With this term, some researchers want to emphasise the technological and relational aspects of abuse in the specific context of coercive and controlling intimate relationships (Dragiewicz, et al., 2018). This can include: harassment on social media, stalking using GPS data, clandestine and conspicuous audio and visual recording, threats via SMS, monitoring email, accessing accounts without permission, impersonating a partner, publishing private information ('doxing'), or sexualised content without consent (Dragiewicz, et al., 2018).

Technology-facilitated sexual violence (TFSV) refers to behaviours where digital technologies are used to facilitate both virtual and face-to-face sexually based harms. Such behaviours include online sexual harassment, gender- and sexuality-based harassment, cyberstalking, image-based sexual exploitation, and the use of a carriage service to coerce a victim into an unwanted sexual act (Henry & Powell, 2018). Digital sexual violence includes image-based abuse as an umbrella term that covers various forms of digital gender-based violence and includes upskirting and creepshots, non-consensual pornography (revenge porn), sextortion, synthetic sexual media and deepfake pornography, sexting and abusive sexting, documenting or broadcasting sexual assault/rape videos, cyberflashing, technology-facilitated unwanted sexual experiences, online grooming, and electronically facilitated trafficking (UNDP, 2018).

Additionally, scholars recognise **public or platform-based forms of gendered violence**, such as doxxing, misogynistic hate speech, and coordinated online harassment targeting women in public life. It means persistent targeting of an individual with threats, defamation, and privacy invasions that cause severe emotional distress or the fear of physical harm (Citron & Penney, 2018).

Technology-facilitated domestic or intimate partner violence (TFDV) is a term used by scholars to describe a situation where digital means are used to maintain control and intimidation within the private sphere. It is crucial to acknowledge the distinct nature of technology-facilitated abuse. In an era of constant digital connectivity, where individuals can reach one another at any time and from any place, perpetrators can transcend physical and temporal boundaries to covertly or overtly inflict harm through a wider range of abusive practices. The resulting scope and opportunity for technologically facilitated victimisation are therefore extensive. When this expansive potential is coupled with victims' experiences of abuse as omnipresent and inescapable, their "space for action", the capacity to resist and seek help, becomes severely constrained (Rogers, Fisher, Ali, Allmark, & Frontes, 2023, p. 2221). Digital domestic and inter-partner abuse refers to the intentional use of digital technologies (including smartphones, social media platforms, and other internet-based tools) to harass, monitor, threaten, stalk, or intimidate the victim. This form of violence reflects how technological advancement not only transforms modes of connection but also expands opportunities for control, surveillance, and victimisation in both private and public spheres (Crisis House, 2023). As noted earlier, the expansion of digital communication has produced not only new forms of social interaction but also digitally



mediated versions of intimacy. This is particularly evident in relationships between partners who do not share the same geographic space. In long-distance intimate relationships, much of the emotional connection is transferred into online environments, where interaction primarily occurs through digital communication. Regular messaging, video calls, sharing personal experiences, and planning future visits are common practices that foster closeness, attachment, and mutual vulnerability. Consequently, the absence of physical proximity does not diminish the presence of intimacy. In fact, partners routinely engage in disclosures and emotional exchanges that mirror offline intimacy. Yet, this very vulnerability creates opportunities for abuse, as the digital sphere becomes a space where one party may manipulate communication, monitor behaviour, or exert control. In this way, digitally mediated intimacy can both sustain relationships and expose individuals to unique forms of technology-facilitated harm (Anayiotou, 2024).

For this purpose, perpetrators exploit digital tools to invade victims' privacy, monitor their behaviour, and erode their autonomy and sense of safety. In many cases, such abuse transforms the domestic sphere into a digital environment of constant surveillance and coercion. Abusers employ technological means in several interrelated ways (Crisis House, 2023).

- **Surveillance:** Perpetrators may install spyware or tracking applications on victims' devices to monitor communications, browse histories, or even use GPS technology to follow their physical movements.
- **Isolation:** By controlling access to communication channels, such as calls, text messages, or social media, abusers restrict victims' interaction with family, friends, and support networks, thereby reinforcing emotional dependency and social isolation.
- **Impersonation:** Offenders can hijack victims' online identities by gaining unauthorised access to social media or email accounts, using them to send false messages, post damaging content, or manipulate relationships, ultimately harming the victim's reputation and credibility.

These forms of abuse reveal how digital technologies, initially designed to enhance connection, can be repurposed into tools of coercion and domination. As such, technology-facilitated domestic violence represents not only an evolution of traditional patterns of control but also a significant criminological and legal challenge, demanding updated frameworks for prevention, investigation, and victim protection.

The Impact

Coercive control refers to a pattern of behaviours and tactics, ranging from physical violence to non-physical forms of manipulation, designed to undermine a victim-survivor's autonomy and create dependency on the perpetrator. Rather than occurring as isolated incidents, coercive control is continuous and cumulative, with repeated actions that gradually erode the victim-survivor's freedom, independence, and sense of equality. Through this sustained domination, the perpetrator can influence nearly every domain of the victim-survivor's life to the extent that her identity, agency, and personhood are diminished (MacDonald, Truong, Willoughby, & March, 2023). Behaviours that may appear ordinary or even benign in healthy relationships can become deeply abusive within the dynamics of coercive and controlling partnerships. The distinction lies not in the technology itself, but in the intent and context of its use. For example, location-tracking applications might be used consensually in non-abusive relationships to coordinate meetings or ensure mutual safety. However, within an abusive context, the same applications can be weaponised to stalk, monitor, and control a current or former partner's movements (Sugiura, et al., 2024). Similarly, digital tools that ordinarily facilitate connection, such as video-calling platforms like *FaceTime*, which may help parents maintain contact with their children, can pose significant risks for survivors of domestic abuse who share custody or communication channels with an abusive ex-partner. These technologies, while designed for connectivity, may inadvertently



enable continued access and intrusion by the perpetrator (Dragiewicz, O'Leary, & Ackerman, Children and technology-facilitated abuse in domestic and family violence situations, 2020).

The consequences for victims of this type of violence are profound.

Psychologically, TF-IPV produces constant fear, anxiety, hypervigilance, and a loss of personal freedom. Victims feel constantly monitored even in spaces where they should feel safe. The digital nature of surveillance, often invisible or covert, creates a sense of omnipresence, where victims may believe the abuser can see or access every aspect of their lives (Woodlock, Salter, Dragiewicz, & Harris, 2022). Impacts varied and included: lack of or limited access to finances and online banking; loss of employment; restrictions and prevention in securing employment; the accrual of debt; payment of hefty fees for the removal of sexual images from social media and web-based platforms; and financial implications of purchasing new or replacement devices. The reported **harms to the mental health** of victims/survivors ranged from the diagnosis of mental health conditions (e.g., depression and general anxiety disorder) to the doubting of one's sanity (through gaslighting) and suicidal ideation (Bond & Tyrrell, 2018). Widespread feelings of fear and humiliation were reported across studies, and, in some instances, embarrassment and fear meant some were unwilling to report the abuse. This can also lead to sleep disturbances, depression, emotional exhaustion, and long-term trauma. **Socially**, victims may withdraw from friends, family, and online platforms to avoid humiliation or harassment, resulting in **isolation and loss of support networks**.

Economically, the intersecting control of finances and technology results in a lack of access to banking (and therefore money) when a perpetrator changes passwords for the internet banking of a victim/survivor or destroys her devices (thereby causing social impacts of isolation of the victim from the social network). Alongside the financial impacts of this, victims'/ survivors' limited participation in the digital world can have a negative impact in terms of job prospects and other aspects of daily living (Douglas, Harris, & Dragiewicz, 2019).

Moreover, some behaviours involving technology, although not explicitly illegal, can still produce profound harm when situated within the framework of domestic abuse. Perpetrators frequently exploit online platforms and social media to harass, intimidate, or monitor victims. The use of geolocation software, spyware, and surveillance technologies extends their reach, providing new means to observe, track, and exert psychological dominance over victims – ultimately blurring the boundaries between the digital and physical dimensions of abuse (Sugiura, et al., 2024).

Research indicates **TFCC** affects victim-survivors across multiple dimensions of their lives. Studies report that victim-survivors often experience a profound sense of loss, which may relate to the end of the relationship, a disconnection from their pre-abuse identity, diminished trust in technology, and an erosion of safety and personal freedom (Woodlock, Salter, Dragiewicz, & Harris, 2022). TFCC can also reduce a person's capacity to participate in work, education, and social activities while contributing to isolation from family and friends (Douglas, Harris, & Dragiewicz, 2019). TFCC may also increase dependency on the perpetrator and restrict a victim-survivor's ability to seek assistance from police, healthcare professionals, or social supports (Douglas, Harris, & Dragiewicz, Technology-facilitated domestic and family violence: Women's experiences, 2019). Further consequences include diminished self-confidence and self-esteem, increased risk of self-harm (Harris & Woodlock, 2019) and strained relationships with children, particularly when perpetrators involve them in facilitating abuse (Dragiewicz et al., 2022). This can lead to the risk of victim-survivors stopping using technology due to the tendency to advise women to stop using technology, which can lead to reduced help-seeking behaviour and an inability to escape abuse (Australian Government, eSafety Commissioner, 2023).

For victims, the impact of this technologically facilitated violence is not only harm in the moment but also deep, enduring consequences for mental health, social connection, financial stability, and person-



al autonomy. This makes this type of violence that runs within family and/or intimate relationships a growing area of concern for criminology, law enforcement, and victim support services, requiring new protective measures, legal reforms, and specialised responses.

RELEVANT INTERNATIONAL FRAMEWORK

International legal and policy bodies have increasingly recognised the digital dimension of gender-based violence and expanded protections accordingly. In 2017, **CEDAW General Recommendation No. 35** explicitly extended the Convention's scope to technology-mediated environments, affirming that contemporary forms of violence also occur online and in other digital environments (General Recommendation No. 35 on Gender-Based Violence against Women, Updating General Recommendation No. 19, 2017). Similarly, **GREVIO's General Recommendation No. 1** introduced the term "digital dimension of violence against women" and set out concrete protection measures, including accessible information on legal remedies, online and offline complaint mechanisms, and specialised support services such as psychological and legal counselling for victims of technology-facilitated abuse. GREVIO further emphasised that national helplines and service providers must be trained and equipped to respond to digital forms of violence, ensuring equal access for all victims, including those with disabilities (GREVIO General Recommendation No. 1 on the digital dimension of violence against women, 2021). The **Istanbul Convention** (Council of Europe Convention on preventing and combating violence against women and domestic violence, 2011), although drafted before today's digital expansion, requires states to criminalise psychological violence, stalking, and sexual harassment – all of which include digital forms. GREVIO has clarified that digital stalking, online harassment, and image-based abuse fall under the Convention's obligations.

In 2024, the **European Union adopted the Directive on combating violence against women and domestic violence**, which uses the term *cyber violence* and defines specific offences such as cyberstalking, cyber harassment, non-consensual sharing of intimate material, and online incitement to hatred or violence. The Directive also requires Member States to allow victims to submit complaints through secure digital channels for cybercrime-related offences and to ensure access to protection and support services (DIRECTIVE (EU) 2024 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on combating violence against women and domestic violence, 2024). Also, several **EU legal instruments** contribute to the protection of victims of digital abuse, including the **Victims' Rights Directive (2012/29/EU)**, the **Directive on combating sexual abuse and sexual exploitation of children (2011/93/EU)**, the **General Data Protection Regulation (GDPR)**, the **Audiovisual Media Services Directive**, and the **Directive on preventing and combating trafficking in human beings (2011/36/EU)**.

The European Commission's **Advisory Committee on Equal Opportunities for Women and Men** (Advisory Committee on Equal Opportunities for Women and Men, 2020) additionally recommends the term *cyber violence against women*, defining it as gender-based violence committed directly or indirectly through digital technologies and encompassing psychological, physical, sexual, or economic harm, as well as threats, privacy violations, image-based abuse, hacking, identity theft, and harassment. Critically, cyber violence is recognised as part of a broader continuum of violence against women and not as a separate phenomenon.

Together, these frameworks recognise digital/online forms of violence as part of GBV and impose obligations on states to criminalise intentional digital violence and address forms of online psychological abuse, digital stalking, and technology-facilitated sexual harassment, ensuring that responses to gender-based violence are comprehensive in both offline and online environments.



ABOUT NORTH MACEDONIA

As in many countries, the spread of smartphones, social media, and encrypted messaging has extended coercive control beyond the home. In North Macedonia, policy and monitoring bodies now explicitly recognise a *digital dimension* of violence against women, and service-provision gaps have been flagged (e.g., training and equipping helplines and specialist services to handle digital abuse). North Macedonia still lacks a consolidated, publicly accessible, official dataset isolating TF-IPV incidents specifically; most figures are embedded in broader cybercrime, VAW, or media-safety reporting. This is also reflected in GREVIO's calls to reinforce service coverage for the digital dimension of violence.

A UNICEF U-Report poll of youth in North Macedonia found that, in 2022, 24% felt under threat online, and 1 in 3 reported being victims of cyberbullying – most often via social media and chats. While youth-focused, these data illustrate the scale of tech-enabled harms in the population that later transitions into adult relationships (Unicef, 2023). An online survey conducted by UNDP (UNDP, 2018) on 311 people (95% women, 4% men, and 1% transgender, 55% aged 31 to 45, 40% aged 18 to 30, 3% aged 16 to 18, 2% over 46) showed that of the total number of participants, 186 people, or 60%, had faced some or several forms of technologically enabled gender-based violence. Of these, 96% were women, 3% were men, and 1% were transgender. However, the survey was not conducted on a representative sample, and the majority of participants filled out the questionnaire via Facebook, which is most often used by people aged 31 to 45 and is not entirely adequate for our research topic. According to a survey by the Helsinki Committee (2021) of 300 respondents in three cities, 78% were victims of cyberbullying. In certain situations, such cases end in suicide, because victims of this violence, where images, content, and personal data are shared without consent, feel powerless to prevent it (Anastasovska & Mitov). In 2019, high exposure to online harassment among women (notably women journalists) was detected by some regional surveys helped by the OSCE mission (OSCE, 2019), aligning with local findings and underscoring the need for stronger institutional responses.

Due to the ratification of the Istanbul Convention and Criminal Code amendments in 2023, for the first time, stalking (article 144-a) and sexual harassment (190-a), which can be done by using electronic devices for communication, were explicitly recognised as crimes, strengthening the basis for prosecuting TF-IPV behaviours (e.g., persistent unwanted digital contact, monitoring, harassment) (Criminal Code, 2023). The definition of gender-based violence in the Criminal Code recognises physical, psychological, and economic gender-based violence but does not specifically mention technology-facilitated GBV as a distinct form of gender-based violence (UNDP, 2018). Article 144 regulates the criminal offence of threatening the safety, paragraph 5 – whoever, through an information system, threatens to commit a criminal offence for which imprisonment of five years or a more severe punishment is prescribed, against a person due to their gender, shall be punished with imprisonment from one to five years. Article 193 criminalises the act of displaying pornographic material to a child, and paragraph two stipulates that if the act is committed through means of public information, the perpetrator shall be punished with imprisonment from three to five years.

The Law on Prevention and Protection from Violence against Women and Domestic Violence from 2021 is a landmark framework law that aligns with the Istanbul Convention, introducing key definitions (including stalking and sexual harassment), and mandating comprehensive victim protection and coordinated services – intended to cover online/technology-mediated contexts as well (Law on Prevention and Protection from Violence against Women and Domestic Violence, 2021). The Law, however, lacks specific protective measures and specific services tailored to technology-facilitated GBV (UNDP, 2018).



CONCLUSION

Technology-facilitated domestic and intimate partner violence represents an evolving dimension of gender-based violence, where digital tools extend the reach of coercion and control beyond physical proximity. Through surveillance, harassment, image-based abuse, impersonation, and digital monitoring, perpetrators can exert continuous pressure on victims, generating fear, dependency, isolation, and long-term psychological harm. Research consistently shows that digital abuse does not replace traditional forms of violence but functions as a continuation of them, allowing intimate partner violence to persist across spaces, relationships, and time – even after separation.

International legal instruments have increasingly responded to this reality. CEDAW General Recommendation No. 35, GREVIO General Recommendation No. 1, the Istanbul Convention, and most recently the 2024 EU Directive on combating violence against women and domestic violence all recognise the digital dimension of abuse and impose obligations on states to criminalise cyberstalking, cyber-harassment, non-consensual sharing of intimate material, and other forms of cyber violence. They further emphasise accessible reporting mechanisms, specialised support services, and training of institutions to properly address online victimisation.

North Macedonia has begun to align with these standards. The Law on Prevention and Protection from Violence against Women and Domestic Violence (2021) and Criminal Code amendments (2023) explicitly recognise stalking and online harassment as criminal acts, creating a legal foundation for addressing technology-facilitated abuse. High-profile cases such as *Public Room* revealed both the scale of online victimisation and the urgent need for more effective institutional responses.

Despite progress, significant challenges remain. North Macedonia still lacks systematic data collection on TF-IPV, institutional capacity for rapid response, and specialised training for police, prosecutors, social workers, and support services. Many victims continue to face barriers when reporting online abuse, while offenders exploit gaps in technology oversight, digital evidence procedures, and platform cooperation.

In this context, future policy must focus on implementing the existing legal framework, strengthening victim protection mechanisms, and ensuring that support services are equipped to address digital forms of violence with the same seriousness as offline abuse. As technology continues to shape intimate relationships, North Macedonia – like other countries – must adapt its criminal justice, social services, and prevention measures to ensure that the digital sphere does not become a space where violence is invisible, unregulated, or unpunished.

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WHAT IS A TERRORIST ORGANIZATION? A CASE FOR RE-CONCEPTUALIZATION

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ABSTRACT

Purpose: The problems of defining terrorism have been widely discussed for decades within the academic community, political decision-makers, and legal scholars and practitioners alike. While some elements in the definition are more or less agreed upon, for example, political motivation and violence or the threat thereof, others are still disputed. Among these is the issue of perpetrators of terrorism, in several ways. One of them is certainly the question, “Can a state commit acts of terrorism?” More pressing, taking into account transformations of terrorism in the 21st century, may be the need to explore whether individuals can commit terrorism, or is the presence of an organization as a perpetrator a necessary feature of the very definition of the concept. The primary aim of this paper is to re-examine the concept of a terrorist organization and its implications for both the theoretical understanding of terrorism and the practical countermeasures against this threat. This will be done primarily, but not exclusively, from the perspective of political science.

Design/Methods/Approach: Drawing from an abundant body of scholarly literature on terrorism and terrorist organizations, this paper will endeavor to answer three separate research questions:

1. What constitutes a terrorist organization, that is, when is it justified to qualify a group as a terrorist organization?
2. Was there ever a scholarly consensus about the defining features of a terrorist organization, and has it changed in the 21st century?
3. Is the presence of a terrorist organization behind the act of violence a necessary component of the definition of terrorism?

Findings: The main finding of this paper is that there is no universally accepted definition of a terrorist organization, nor is it clear that only acts of violence perpetrated by organizations can or should be designated as terrorism. The evolving nature of terrorism itself, perhaps accelerating in this century, suggests that the concept of terrorist organization and its relation to the concept of terrorism must be re-examined and re-conceptualized, for two main reasons. The first is the shift in the landscape of Islamist terrorism after 9/11 and subsequent wars in Afghanistan and Iraq, from tightly knit and hierarchical organizations such as al-Qaeda to more or less decentralized groups sharing ideology and goals but not operational data (increased accessibility and parallel evolution of the Internet has played a significant role in this). While the concept of leaderless resistance was not invented by Islamists, it was widely adopted by them, as well as by violent groups with very different ideological backgrounds and political objectives. The other reason is the emergence and increase of so-called lone wolf terrorism, that is, a growing number of attacks perpetrated by individuals with no obvious link to any organization.

Originality/Value: The theoretical conceptualization of the terrorist organization as a distinct phenomenon is somewhat lacking, with empirical research and case studies accounting for the vast ma-

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jority of scholarly literature on the subject. However, the answer to the question “What counts as a terrorist organization in the 21st century?” is not of strictly academic interest. Given that many national penal codes list membership in a terrorist organization as an offence per se, it has serious practical implications. Moreover, to efficiently counter contemporary terrorism, it is necessary to understand its actors and the ways in which they organize and operate.

Keywords: terrorism, terrorist organization, lone wolf terrorism, terrorists online.

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PURPOSE

The problems of defining terrorism have been widely discussed for decades within the academic community, political decision-makers, and legal scholars and practitioners alike. Although Laqueur (2002) famously claimed that a clear definition of terrorism is neither possible nor necessary for scholarly research of this phenomenon, this position is not widely held. It seems, however, that after half a century of terrorism research (Haghani et al., 2022), the only consensus reached seems to be the one about the absence of a universally accepted definition.

While some elements of the definition are more or less agreed upon, for example, political motivation and violence or the threat thereof, others are still disputed. Among these is the issue of perpetrators of terrorism, in several ways. For one, the scholarly debate on the difference between terrorism and *terror*, and more generally, on the possibility of a state being perpetrator or supporter of terrorism, is still far from resolved (see, for example, Simeunović, 2009).

More pressing need, taking into account transformations of terrorism in the 21st century, may be an exploration into whether *individuals* can commit terrorism, or the presence of an organization as a perpetrator is a necessary feature of the very definition of the concept. Whatever the answer to this question may be, it also implies the necessity of determining what the terrorist organization (or group, network, or perhaps movement) actually is.

The purpose of this paper is, therefore, to once more consider these issues, with the primary aim of re-examining the concept of a terrorist organization and its implications for both the theoretical understanding of terrorism and the practical countermeasures against this threat. This will be done primarily, but not exclusively, from a political science perspective.

DESIGN/METHODS/APPROACH

Within an abundant body of scholarly literature on terrorism, there are few systematic attempts to conceptualize terrorist organizations, and even fewer endeavours to theorize them adequately. It is therefore hard to find a single theoretical framework for understanding what constitutes a terrorist organization and how changes in terrorism itself affect the concept. However, there is more than enough research on specific terrorist organizations and different aspects of their internal structure and/or dy-



namics, ideologies, strategies, and tactics, as well as scholarly literature on the transformations of terrorism in the 21st century, to enable further investigation into the nature of terrorist activities today. Building on this significant body of published academic research, this paper will endeavor to answer three separate research questions:

1. What constitutes a terrorist organization, that is, when is it justified to qualify a group as a terrorist organization?
2. Was there ever a scholarly consensus about the defining features of a terrorist organization, and has it changed in the 21st century?
3. Is the presence of a terrorist organization behind the act of violence a necessary component of the definition of terrorism?

FINDINGS

The main finding of this paper is that there is no universally accepted definition of a terrorist organization, nor is it clear that only acts of violence perpetrated by *organizations* can or should be designated as terrorism. The evolving nature of terrorism itself, perhaps accelerating in this century, suggests that the concept of terrorist organization and its relation to the concept of terrorism must be re-examined and re-conceptualized, for three main reasons. The first is the shift in the landscape of Islamist terrorism after 9/11 and subsequent wars in Afghanistan and Iraq, from tightly knit and hierarchical organizations such as al-Qaeda to more or less decentralized groups sharing ideology and goals but not operational data (increased accessibility and parallel evolution of the Internet has played a significant role in this). While the concept of *leaderless resistance* was not invented by Islamists, it was widely adopted by them, as well as by other violent groups with very different ideological backgrounds and political objectives. The second reason is the emergence and increase of so-called *lone wolf terrorism*, that is, a growing number of attacks perpetrated by individuals with no obvious link to any organization. Finally, some of the most notorious organizations designated as terrorists by national governments and international organizations alike - such as al-Qaeda, Hamas, Hezbollah, or Islamic State - are consistently engaged in many other forms of political and social activities. Their own self-identification, but more importantly, the totality of their operations, calls into question the accuracy as well as the usefulness of reducing them to terrorist groups.

State of the art: conceptual confusion

Ongoing scholarly debates about the definition of terrorism necessarily reflect on the conceptualization of terrorist organizations. The most obvious and the most intuitive definition, that the terrorist organization is an organized group engaged in planning and execution of terrorist acts, depends heavily on the way one defines terrorism itself, thus plunging the discourse back into that conceptual minefield (Saul, 2019). Furthermore, the terminology used by researchers differs, with terms such as *terrorist organization* and *terrorist group* sometimes used interchangeably.² Unsurprisingly, the interest in terrorist organizations (see Figure 1) has grown steadily since the second half of the 20th century, reaching a peak after the 9/11 attacks and during the height of the War on Terror (2001-2010). Relevant to the purpose of this research is also the slight decline in interest in recent years.

2 This is also the way those terms will be used in this paper. However, it could be argued that the organization is more of a formal entity.



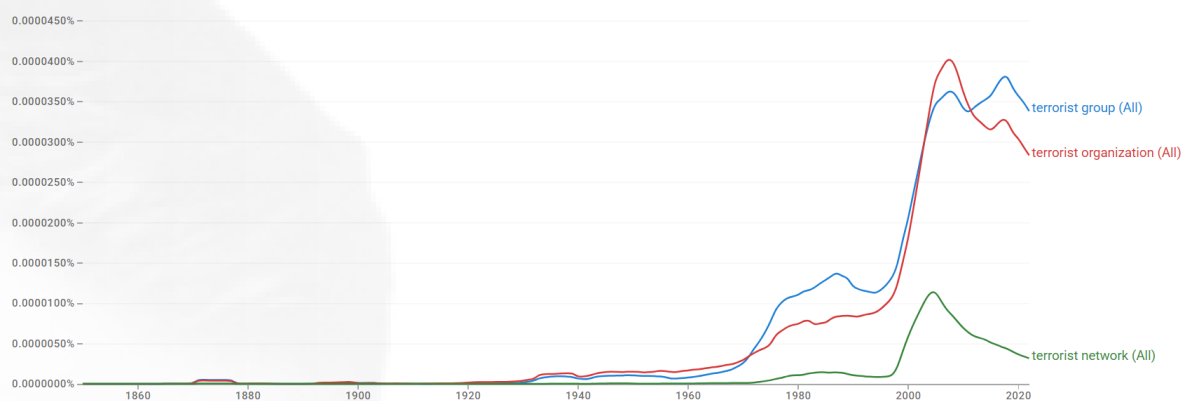


Figure 1: *Terrorist groups, organizations, and networks in the English language corpus.*
(generated by Google Ngrams: <https://books.google.com/ngrams/info>)

Figure 1 also shows that the term “terrorist network” first appears in the 1970s and gains traction in the 21st century, coinciding with the widespread adoption of personal computers and the Internet. The seminal work on this topic was conducted by Zanini and Edwards (2001), as well as Sageman (2008), and will be discussed in more detail in the following sections.

The problems of defining terrorist organizations are not exclusively academic. Similar to definitions of terrorism, attempts to define a terrorist organization can be categorized as administrative and academic (see Simeunović, 2009). Administrative definitions can be further classified as *legal* definitions that can be found in national or international legal documents, and, for lack of a better term, *administrative* definitions in a stricter sense - those made by and for government (or international) bodies and agencies.

The importance of legal definitions is paramount, since many states, including the Republic of Serbia (see Bodrožić, 2017), have made membership in a terrorist organization a criminal offence *per se*. These legal provisions, however, are not without their own problems. Some national legislations work under the assumption of the existence of formal terrorist organizations (Sageman, 2008, p. 169). Other legislators opt to define terrorist groups within the law itself, but the definitions vary in scope and precision. It could be argued that these definitions are the most pertinent from the perspective of counter-terrorist efforts. Still, a more comprehensive analysis of legal definitions is beyond the scope of this research paper, and they are of limited use in scholarly research on terrorism as a socio-political phenomenon.

Some of the administrative definitions are also codified in legislation. They are usually tied to lists of designated terrorist organizations maintained by governments or international organizations, such as the United States Department of State³, the European Union⁴, or the United Nations⁵. These definitions are also not necessarily consistent among themselves, and are tailored to serve the specific needs of the entities issuing them. Sometimes they are only implied: for example, the United Nations does not have an explicit definition of a terrorist organization.

The United States Department of State Foreign Terrorist Organization list (usually referred to as the FTO list) is an interesting example, being frequently used by scholars as a sample for their research (see Phillips, 2015) but also being itself a subject of academic inquiry (see, for example, Hinckson, 2017). It was established in 1997 as a response to three terrorist attacks: the World Trade Center

³ List available at <https://www.state.gov/foreign-terrorist-organizations>

⁴ The latest list is available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02001E0931-20250201>

⁵ The list of individuals and entities under UN sanctions is available at: <https://main.un.org/securitycouncil/en/content/un-sc-consolidated-list>



bombing in 1993, the Oklahoma City bombing⁶, and the Aum Shinrikyo attacks in Tokyo in 1995. The process of listing (and delisting) of organizations is complicated, prescribed criteria are broad, and different political interests are sometimes involved (see Loertscher et al., 2020). From an academic perspective, however, the Foreign Terrorist Organizations list “is a very specific subset of terrorist groups” (Phillips, 2015, p. 236), and the same is true for other similar national or international lists.

The deficiencies of the administrative definitions underscore the need for a sound academic definition as a foundation of empirical research. Indeed, ever since the beginning of the terrorism studies as a distinct field of social science in the 1970s, the terrorist group has been considered “the primary unit of analysis in studies of terrorism, in line with the common assumption that acts of terrorism are mainly carried out by members of formal, identifiable terrorist organizations” (Berger Hobson & Moghadam, 2024, p. 568). And yet, the scholarly debate over the definition of a terrorist group (or organization) has been much smaller in scale compared to the discussion of the definition of terrorism. The study of terrorist organizations is still primarily empirical in nature, and a significant number of researchers abstain from explicitly defining what they consider to be a terrorist group. Although the number of published papers discussing the issues of definition has increased in recent years (Berger Hobson & Moghadam, 2024; Phillips, 2015; Young & Dugan, 2010), the question of what counts as a terrorist organization is far from settled. For example, Silke (2001, p. 3) has included the question “What makes a group a *terrorist* group?” among the fundamental questions the field has not answered in a satisfactory manner. Similarly, McCormick (2003, p. 474) sees “the definition of a terrorist group or terrorist organization, in contrast to a group or organization that sometimes employs terrorism” as one of the contested issues in terrorism research.

Quarter of a century later, the situation in the field mostly remains the same. The only somewhat systematic analysis of the literature on terrorist groups, provided by Phillips (2015, p. 228), finds that “there has been little analysis of the concept, and basically no consideration of implications of different definitions. Most studies of terrorist organizations have tended to either avoid defining the concept or offer a definition without justification or discussion. Either of these choices ignores contrasting definitions in the literature, and related questions of how different definitions might affect inferences.” Reasons for this, Phillips argues, are twofold. Either they believe the concept is essentially contested and can therefore not be defined, or they see terrorism as a tactic and consequently an inadequate qualifier to describe a group, as it can be used by anyone. The latter position was later labeled by Berger Hobson and Moghadam as *rejectionist*, since “it rejects the logic and utility of the idea of the ‘terrorist group’ as a distinct actor category” (Berger Hobson & Moghadam, 2024, p. 569).

Among the existing definitions of terrorist groups or organizations, Phillips distinguishes between *inclusive* and *exclusive* definitions. Inclusive definitions are essentially those that consider every organization that uses terrorism to be a terrorist organization. The problem with this type of definition is that it is harder to operationalize, and, as was already pointed out, it inherits all the problems related to the definition of terrorism. Exclusive definitions, on the other hand, insist that the label should be applied only to those organizations that use terrorism *primarily*, *regularly*, or *significantly* (Phillips, 2015, p. 232). A vital distinction some authors draw between terrorist and guerrilla groups concerns the control of territory, although this position is also contested.

Even though there is no consensus among the researchers, the terms terrorist group and terrorist organization seem to be used in a fairly consistent way in the scholarly literature. There are certain elements of the definition that are generally seen as unproblematic, at least among those who do not subscribe to the rejectionist approach: subnational character, political motivation, and the use of ter-

6 Interestingly, and perhaps paradoxically, the Oklahoma City bombing by Timothy McVeigh is one of the most recognizable instances of lone-wolf terrorism.



rorism as a highly symbolic form of violence (Phillips, 2015). For most of the 20th century, and even today, it was assumed that terrorist groups “have formal organizations with a coherent command and control structure” (Sageman, 2008, p. 31). Nevertheless, the lack of explicit definitions and underconceptualization remains a serious unresolved issue of research on terrorist organizations.

Terrorists of the 21st century: decentralized, diversified, dispersed

Three trends that started in the late 20th century have continued and gained traction after 9/11, reshaping the nature of the terrorist threat: the rise of leaderless resistance, lone-wolf terrorism, and the hybrid organizations. Taken together, they are seriously challenging the assumptions and conventional wisdom on the actors of terrorism, and the usefulness of the very concept of a terrorist group or organization.

The concept of *leaderless resistance* was born as a “mark of despair” (Kaplan, 1997) of the white supremacist organizations in the United States in the face of increased suppression by the government. Although, as Kaplan notes, it was part of the *zeitgeist* and a subject of internal debate on the extreme right since the 1960s, it was formally introduced by Louis Beam’s eponymous essay published in 1983 and then again in 1992. He himself attributes the concept to a former intelligence officer Ulius Louis Amoss, and describes it as “[a] system of organization that is based upon the cell organization, but does not have any central control or direction [...] Utilizing the Leaderless Resistance concept, all individuals and groups operate independently of each other, and never report to a central headquarters or single leader for direction or instruction, as would those who belong to a typical pyramid organization” (Beam, 1992).⁷ The idea of leaderless resistance was further popularized by William Pierce’s novels *The Turner Diaries* and *Hunter*.

Some still consider the threat of leaderless resistance a mere nuisance, but there seems to be a growing scholarly consensus that, due to both technological and social changes, this type of terrorist operation is now taking over in terms of frequency, scope, and destructive potential (Michael, 2012). This is reflected in the increased volume and depth of scholarly research on the phenomenon. Still, the definition, as well as its relations with other, similar concepts, remains contested. Sweeney’s (2019) analysis of the scholarly literature on leaderless resistance points out that there are differing views on the distance between individuals engaged in this type of violence and the organizations they may identify with. The strong version of the argument is that, in order to be recognized as a leaderless resistor, one must not belong to or identify with the organization. However, the more moderate approach, which postulates the absence of functional links with the organization as a requirement, seems more operationally useful.

While it remains the favorite practice (as well as theory) of right-wing extremists, the idea of leaderless resistance as a viable tactic against government has spread from the extreme right to other parts of the political spectrum in the 21st century. It was, since then, utilized by eco-terrorists, animal rights groups, and antiglobalists alike (Michael, 2012). Most importantly, it was, especially after 9/11, embraced by Islamists worldwide. According to Sageman (2008), the adoption of the leaderless resistance doctrine, enabled by the Internet, was the key factor in transforming al-Qaeda into a social movement.

A concept of lone-wolf terrorism⁸, similar to and sometimes conflated with leaderless resistance, was also popularized by the American extreme right in the late 1990s, even though it can be traced back to the anarchists of the 19th century and is now adopted by proponents of different ideologies (Bakker

⁷ The full text of Beam’s essay is available online at: <https://www.louisbeam.com/leaderless.htm>. Beam was also, in another essay, “the first to propose - and attempt to institute - the use of computers as a tool of radical right communication and recruitment” (Kaplan, 1997).

⁸ It should be noted that there are suggestions that other terms, such as solo-actor terrorism or freelance terrorism should be used to avoid glamorizing the phenomenon and its actors.



& De Graaf, 2011). According to Feldman (2013, p. 271), in the 21st century this variety of terrorism “is on the rise by all accounts, and by every indicator”. However, the scholarship on the subject is still undecided on the definition. The boundaries of the concept remain “fuzzy and arbitrary” (Spaaij, 2010). The key issue, especially with distinguishing between lone-wolf terrorism and leaderless resistance, seems to be focused on the concept of a group. Namely, there is a disagreement among scholars whether attacks by very small groups - consisting of two or three persons - count as lone-wolf attacks or leaderless resistance. Spaaij thus proposes a narrow definition, drawing a clear line between the two phenomena. In his view, the label of lone-wolf terrorism should be applied only to “attacks carried out by persons who (a) operate individually, (b) do not belong to an organized terrorist group or network, and (c) whose *modi operandi* are conceived and directed by the individual without any direct outside command or hierarchy” (Spaaij, 2010, p. 856).

As the fourth, religious, wave of terrorism, which started with the Iranian revolution in 1979 (Rapoport, 2013), continues into the 21st century, Islamist terrorism remains the most serious threat (see, for example, Sageman, 2008). Islamist organizations, such as al-Qaeda, Islamic State, Hezbollah, and Hamas, are perceived as the major terrorist groups. Each of them, not necessarily in the same way, challenges the assumptions about what a terrorist organization looks like. Traditionally, such groups are believed to have a hierarchical, pyramidal structure, not unlike modern corporations, which consists of: “a leader (president); an inner circle of senior members (vice presidents); individuals who oversee tasks such as fundraising or bombing (product managers); and, operatives (workers)” (Garfinkel, 2003).

While the terrorist violence is undoubtedly a part of their tactic, and therefore they do fall under an inclusive definition of terrorist organizations, as discussed by Phillips (2015), none of these groups fits exclusively or entirely within the notion of a hierarchically organized formal subnational group that engages primarily in terrorist violence. Interestingly, even before the 9/11 attacks, at the end of the 20th century, Zanini and Edwards had identified Hamas, Hezbollah, and al-Qaeda as belonging to a new type of terrorist organization. “In these loosely organized groups with religious or ideological motives,” they write, “operatives are part of a network that relies less on bureaucratic fiat and more on shared values and horizontal coordination mechanisms to accomplish its goals” (Zanini & Edwards, 2001, pp. 32–33). Together with the Islamic State, they can rightfully be, despite their differences, classified as *hybrid organizations*. The term originates from the work of Ganor (2012), who describes hybrid terrorist organizations as “standing on three legs” - (para)military, political, and social welfare.

Even though al-Qaeda was undoubtedly a hierarchical organization with formal membership (Garfinkel, 2003), even at its beginnings, new members did not pledge allegiance to the organization but to Osama bin Laden personally (Sageman, 2008). After the leadership (as well as a portion of the first generation membership) was decimated in the aftermath of 9/11 and subsequent intervention in Afghanistan, its operation was significantly constrained. However, it has almost immediately evolved into a decentralized, practically leaderless network, a social movement, and/or ideology (Sageman, 2008; Simeunović, 2009). While it did diminish the leadership’s operational control, this development increased the group’s reach.

Hamas, founded after the failure of the first Intifada in 1987 by Ahmed Yassin, has in the meantime undergone many transformations (for a detailed discussion, see Baconi, 2022). Without a doubt, the organization routinely engaged in violence, including terrorist violence targeting civilians. It has achieved notoriety since 1994, by deployment of suicide attacks, which were widely studied (see, for example, Chen, 2012; Gupta & Mundra, 2005; Singh, 2013). At the same time, true to its roots within the Muslim Brotherhood, it maintained charitable operations (Roy, 2016) and was, similarly to al-Qaeda, sometimes defined as a social movement (Robinson, 2004). In 2006, it won the election in Gaza and emerged victorious from the following civil war.



Hezbollah was founded in 1982 as a primarily Shia movement responding to the Israeli invasion of Lebanon. However, it has also evolved into a legitimate political actor in Lebanese internal politics, and its operations and tactics transcend the usual range of terrorist groups. It also consistently engages in different welfare endeavors (Azani, 2013). Both Hamas and Hezbollah have already been identified by some scholars as hybrid organizations, “active across a broad range of domains including politics and negotiation, socio-economic development projects, welfare networks and paramilitary armed resistance” (Lecocq, 2020, p. 1071).

Islamic State (also known as ISIS - Islamic State of Iraq and Syria, or Daesh) is a hybrid organization of a different type. It started out as al-Qaeda in Iraq and was certainly engaging in terrorist attacks. However, it evolved into a large armed force, effectively controlling a spacious territory, capable of financially supporting itself without the need for donations. At the same time, it had employed new digital technologies and built an efficient propaganda machine (Atwan, 2015; Stern, 2016), successful in both recruiting fighters for its Middle East military operations and “franchising” its ideology to independent cells and individuals in Europe, the United States, and Australia. Already by 2015, scholars were calling into question both the accuracy and usefulness of reducing the Islamic State to a terrorist group (Cronin, 2015; Maan, 2015).

* * *

The conceptual confusion and unresolved definitional problems remain the key issues of scholarly research on terrorist organizations. Conceptual papers dealing directly with the topic of definition and systematic literature reviews are few and far between, and they seem to offer no final answer to the question “What is the terrorist organization?” Even though both terrorism itself and academic research on terrorism have undergone profound transformations since 9/11, their effect on the defining features of terrorist organizations is still underconceptualized. While there is already a significant body of research on terrorism in the 21st century, it does little to clarify the prevailing conceptual confusion. Furthermore, the notions of *leaderless resistance* and *lone-wolf terrorism* are not entirely separate⁹, are sometimes used interchangeably, and are neither adequately conceptualized nor operationalized (Michael, 2012; Sweeney, 2019). In addition, the notion of *homegrown terrorism* is frequently used to denote, essentially, the same phenomenon. The main reason is this type of actor’s hesitation to operate outside national borders, mainly due to the ever-increasing border security after 9/11 (see Sageman, 2008, p. 133).

There is, however, one feature of 21st-century terrorism that is widely recognized as influencing both organizational structures and tactical choices. The aftermath of the 9/11 attacks has coincided with the broader spread of the everyday use of the Internet, and terrorists (and would-be terrorists) have, arguably, made the most out of the affordances¹⁰ the new technologies have provided. While the concept of leaderless resistance was developed in the pre-Internet era, it was dramatically popularized and otherwise affected by the increased availability of Internet tools and later platforms. Soon after 9/11 and subsequent interventions in Afghanistan and Iraq, scholars have noted that the leaderless resistance is no longer “an admission of failure of traditional terrorism” (Sageman, 2008, p. 143) but also that the lone wolves actually do belong to the pack, although a virtual one (Weimann, 2015). Furthermore, both al-Qaeda and the Islamic State have proved to be quite adept at using the Internet for the dissemination of their ideology and know-how, and otherwise for “franchising” their brand. Future adaptations by terrorists may include the use of artificial intelligence tools as part of a broader socio-political transformation driven by this technology (Awasthi, 2025; Damnjanović, 2025).

⁹ It is indicative that concepts both of leaderless resistance and lone-wolf terrorism are absent from Thackrah’s Dictionary of Terrorism (2004).

¹⁰ *Affordances* are defined by Tufekci (2017) as opportunities and possibilities offered by new technologies. For further discussion on different theoretical perspectives on technology and politics, see Damnjanović (2018).



ORIGINALITY/VALUE

In conclusion, Phillips's (2015) remark that "the boundaries of group membership and identity are worthy of continued research" still stands a decade later, and seems especially relevant in the light of perpetual changes that terrorism goes through in response to government counter-terrorist policies and practices, social climate, and technological developments.

The answer to the first research question is perhaps the hardest to answer unambiguously. There are many definitions (although they are fewer than it could be expected), and they are different. The dilemmas are many: what counts as a group; is it justified to label a group as a terrorist if it engages in terrorism only rarely or occasionally; what degree of formal organization is required? The only points of consensus are subnational character and engagement in terrorism (no matter how terrorism may be defined).

In contrast, the second research question is fairly easy to answer. For half a century of terrorism studies, there has never been a scholarly consensus about the definition of a terrorist organization. However, some of the assumptions on the subject are challenged in the 21st century. Among them is the notion that terrorism is necessarily a form of collective political action, which answers the third research question. The trends shaping terrorism in this century suggest that terrorist attacks can be, and are, perpetrated by groups and individuals alike.

More importantly, the usefulness and accuracy of the very concept of a terrorist group or organization are contested, and for good reasons. Some authors outright reject it, while others point to the transformations such groups have undergone, rendering the concept insufficient to describe the nuances and complexities of 21st-century terrorism. Thus, Ganor (2012) writes about hybrid organizations, Medina and Hepner (2008) convincingly show that modern terrorist networks can and do include both hierarchical core and leaderless cells, and Berger Hobson and Moghadam (2024, p. 578) argue "in favor of adopting more value neutral labels to describe militant actors operating in recent years".

Finally, it bears reminding that the answer to the question "What counts as a terrorist organization in the 21st century?" is not of strictly academic interest. Given that many national penal codes list membership in a terrorist organization as an offence *per se*, it has profound practical implications. Moreover, to counter contemporary terrorism effectively, it is necessary to understand its actors and how they organize and operate.

This shift in the nature of terrorism in the 21st century, namely an increase in lone-wolf terrorism and diffuse movements, ideologies, and "franchises" (see, for example, Ojo, 2024; Roy, 2023), has serious implications for terrorism research and for counter-terrorism policies and practices. As Sageman noticed, considerations of strategy, tactics, leadership, membership, recruitment, and division of labor apply only to organizations, not movements or ideologies. Nevertheless, he stresses that lone wolves "are terrorists with full responsibility for their actions even though they do not belong to a formal terrorist organization" (Sageman, 2008, p. 31). Some of the counter-terrorist tactics, however, such as targeted assassinations of the key members of the organization - as practiced by both the United States and Israel - may not be as effective when used against loosely organized groups or independent cells (see, for example, Sageman, 2008). The sound conceptual and theoretical understanding of terrorist actors, even if it means reconceptualizing the notion of terrorist organization or abandoning it completely, is *sine qua non* not only of quality research but of successful counter-terrorist efforts.



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PREDICTORS OF PSYCHOACTIVE SUBSTANCE ABUSE IN ADOLESCENTS: THE ROLE OF EXTRAVERSION, NEUROTICISM, PSYCHOTICISM, AND ENVIRONMENTAL RISK FACTORS

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ABSTRACT

Purpose: Drug abuse refers to a range of behaviours that are regulated by criminal law in many countries. Due to their “social danger” numerous studies have examined different aspects of this phenomenon. Among these, a significant number of works focus on the role of personality traits such as extraversion, psychoticism, and neuroticism in the initiation of drug use and the development of substance dependence. In contrast, studies focusing on drug abuse are relatively rare, especially those that examine the aetiological role of personality traits and their involvement in preventive models.

This paper explores the role of personality traits in drug abuse, specifically the extent to which differences in such behaviour can be predicted based on levels of extraversion, neuroticism, and psychoticism. The theoretical foundation of this research is Eysenck’s theory of crime, one of the most prominent biological–psychological theories explaining criminal behaviour. According to this theory, criminal behaviour arises through the interaction of hereditary predispositions and environmental factors, with socialization and classical conditioning playing a significant role.

Design/Methods/Approach: The sample in this research consists of 458 high school students from Belgrade, aged between 15 and 19. The average age of the participants was 17.72 years, with 67.7% being male and 32.3% female. To assess personality traits, the EPQ-R (Eysenck Personality Questionnaire – Revised) was used, adapted for the Serbian-speaking population.

In addition, a specific questionnaire was constructed to examine students’ behaviours related to drug abuse, which includes questions of various types.

Canonical discriminant analysis was used to analyse the collected data.

Findings: Canonical discriminant analysis showed that there is one discriminant function that is statistically significant for both forms of substance abuse (use and distribution). Extraversion had a strong predictive contribution in discriminating both forms of abuse, while psychoticism had a significant impact, especially in the case of drug distribution. Neuroticism did not show a significant effect in distinguishing between adolescents who abuse drugs and those who do not. Among the environmental risk factors, drug and alcohol abuse among peers, criminal behaviour, changing schools,

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running away from home, and poor family relationships (in the case of drug distribution) significantly contributed to differences in substance abuse.

Originality/Value: Considering that the majority of adolescents begin experimenting with drugs during adolescence or even at a slightly earlier age, it is of utmost importance to implement preventive programs at this stage. The findings of this study, as well as those of other research conducted on adolescent populations, may serve as a foundational basis for the development and implementation of such programs.

Keywords: personality, substance abuse, extraversion, neuroticism, psychoticism.

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INTRODUCTION

Drug abuse encompasses a range of behaviours that are criminalized in many countries, including the unauthorized production, processing, distribution, purchase, facilitation of sale or purchase, provision to others, and possession of small quantities for personal use, among other activities. Owing to the significant social harm associated with such behaviours, a substantial body of research has focused on governmental responses, as well as pharmacological, psychiatric, and psychological treatment approaches for individuals with substance use disorders. Moreover, a considerable number of studies have examined the role of personality traits such as extraversion, psychoticism, and neuroticism in the development of dependence on drugs and other psychoactive substances (Cuomo et al., 2008; Abo-Elwahab & Amin, 2014). In contrast, scholarly work specifically addressing drug abuse, particularly those investigating the aetiological contribution of personality traits and their potential role in preventive frameworks, remains relatively limited.

This study explores the role of personality traits in drug abuse, specifically the extent to which differences in such behaviour can be predicted based on levels of extraversion, neuroticism, and psychoticism



(Oljača, 2022). The theoretical framework for this research is grounded in Eysenck's theory of criminality, one of the most influential biopsychological models for explaining criminal behaviour (Eysenck & Eysenck, 1970; Eysenck, 1977). According to this theory, criminal behaviour arises from the interaction between hereditary predispositions and environmental factors, with particular emphasis on the role of socialization and learning processes. Furthermore, the theory posits that individuals comply with laws and social norms because they have been conditioned to do so. When the process of socialization fails, individuals are more likely to engage in rule-breaking behaviour (Knežević, 2003). Eysenck and his collaborators investigated how personality traits, through the predispositions of the nervous system, influence an individual's capacity to adapt to environmental demands (Radulović, 2006).

Eysenck's thesis on the relationship between personality traits and criminal behaviour is now widely accepted (Eysenck, 1994, 1998). Although studies examining the connection between these traits and drug abuse are less prevalent, numerous investigations have highlighted the significance of personality components such as aggression, impulsivity, anxiety, and maladjustment in the context of substance dependence (Mitrović et al., 2006; Cuomo et al., 2008; Šapić, 2008; Abd El Wahab & Amin, 2012).

In addition to Eysenck's model, contemporary theories of impulsivity and self-control can further explain the relationship between personality and risk-taking behaviours. Impulsivity theories emphasize that individuals with a stronger tendency toward rapid and unreflective actions may be more prone to experimenting with psychoactive substances (Khurana & Romer, 2020). Similarly, the theory of self-control (Baumeister et al., 2007) suggests that a lack of impulse regulation and delay of gratification may increase the likelihood of engaging in risky behaviours, including drug abuse. Integrating these contemporary concepts with Eysenck's model provides a broader perspective for understanding etiological factors among adolescents.

The aim of this study is to contribute to the understanding of how personality traits — such as extraversion, neuroticism, and psychoticism can predict behaviours associated with drug abuse, with the broader goal of enhancing prevention efforts among adolescents.

METHOD

Hypotheses

In accordance with the aim of the research, two general hypotheses were formulated:

H1: It is hypothesized that personality traits, extraversion, neuroticism, and psychoticism serve as significant predictors of drug abuse, regardless of the operationalization of the dependent variable.

H2: It is hypothesized that the effect of personality traits on drug abuse is mediated by environmental risk factors.

Variables

The criterion variables refer to two forms of behaviour associated with psychoactive substances:

1. Use of psychoactive substances - A respondent is considered a user if they have consumed any type of psychoactive substance at least twice. This threshold was chosen to exclude single, experimental use (once) that does not reflect a meaningful behavioural pattern, while still including individuals who have used substances multiple times and are therefore more likely to repeat use or develop a habit. However, it is important to note that the threshold of two uses represents a



relatively low cutoff and still includes experimental behaviour; thus, the results should be interpreted within this context.

2. Drug distribution - This variable records instances in which the respondent has given, sold, or offered drugs to another person at least once. The threshold of one occurrence was selected to identify all participants involved in the dissemination of substances, regardless of frequency.

For the purposes of this study, only participants with clearly defined behavioural patterns were included, while those exhibiting mixed behaviours or diagnosed with substance dependence were excluded. These variables are categorical, with the opposing category indicating that the participant has had no contact with drugs.

Predictor variables include the personal traits of the respondents and environmental risk factors:

- Personality traits were operationalized through three dimensions of personality based on Eysenck's model: extraversion, neuroticism, and psychoticism.
- Environmental risk factors consist of a set of 21 variables encompassing various aspects of the respondents' family, school, and peer environments. These factors include, for example, family problems, academic difficulties, peer pressure, and other similar circumstances that may influence the respondents' behaviour.

Sample

The sample consisted of high school students from Belgrade, including one grammar school and three technical schools. The schools were purposefully selected to ensure a sufficient number of students exhibiting the studied disorders, an appropriate gender structure, and variability in key social characteristics, in collaboration with school psychologists. Within the selected schools, students were randomly chosen: one class from the second and third grades and two classes from the fourth grade, including all present students willing to participate.

After eliminating invalid protocols, the final sample comprised 458 participants, of whom 67.7% were male and 32.3% female. The average age was 17.72 years.

Data Collection

Data were collected through group surveys and testing sessions, each lasting between 30 and 45 minutes per group. The testing was conducted on school premises, in collaboration with school psychologists who oversaw the organization and adherence to research protocols. Participation was entirely voluntary and anonymous. Ethical standards in data collection were ensured by safeguarding the privacy and confidentiality of all information obtained during the study.

INSTRUMENTS

To assess personality traits, the EPQ-R (Eysenck Personality Questionnaire – Revised) was used, adapted for our language area (Šipka, 1988, 1992). This instrument measures three core dimensions of personality: extraversion, neuroticism, and psychoticism. All scales demonstrated high reliability, with Cronbach's alpha coefficients exceeding .80, indicating adequate internal consistency of the questionnaire.

Additionally, to examine students' behaviours related to drug abuse, a specific questionnaire was developed comprising various types of items, including Likert scales (five-point and three-point), nom-



inal, and dichotomous questions. This questionnaire is used to assess contact with psychoactive substances as well as to identify environmental risk factors. The validity and reliability of this instrument have been evaluated as satisfactory, making it appropriate for use in the present study (Fajgelj, 2009).

The questionnaire items were provided with predetermined response options, and students responded by selecting the number corresponding to one of these options. The majority of the questions (14) were scaled using a Likert-type format, ranging from “Never” to “Yes, multiple times”. Two questions were scaled from 1 to 3, with responses ranging from “I do not use drugs” to “I use occasionally”, while the remaining five questions featured dichotomous response options. Variables related to drug abuse were scaled with responses ranging from 1 to 5 (three variables), whereas one variable was scaled from 1 to 3.

For all individual questionnaire items related to drug abuse and social risk factor variables, coefficients of validity, reliability, and discriminative power were calculated (see Table 1).

Table 1: Coefficients of validity (*r*), reliability (*h*), and discriminative power (*dp*) were calculated for the variables related to drug abuse (items 1 to 4) and social risk factors (items 5 to 25).

Variable	r	h	dp	Variable	r	h	dp
1. Non-use of drugs	.773	.827	.680	14. Drug addiction and alcoholism in the family	.329	.500	.274
2. Drug selling	.815	.745	.710	15. Criminal behaviour in the family	.330	.465	.262
3. Borrowing drugs	.738	.744	.699	16. Physical punishment by parents	.344	.474	.285
4. Giving drugs as a gift	.739	.689	.650	17. Running away from home	.456	.448	.353
5. Academic achievement	.402	.507	.318	18. Drug addiction and alcoholism among peers	.481	.671	.391
6. Disciplinary punishment	.624	.514	.499	19. Criminal behaviour in peer groups	.434	.645	.337
7. Changing schools	.340	.594	.244	20. Victim of threats at school	.627	.638	.536
8. Sudden drop in academic performance	.374	.402	.301	21. Victim of threats outside school	.653	.667	.565
9. Inattentiveness in class	.530	.607	.426	22. Victim of physical assault at school	.494	.678	.420
10. Irregular studying	.580	.687	.487	23. Victim of physical assault outside school	.614	.660	.528
11. Irregular completion of homework	.547	.698	.452	24. Victim of student boycott	.461	.539	.377
12. Poor relationships among family members	.301	.590	.250	25. Victim of ridicule	.462	.646	.387
13. Poor parent-adolescent relationships	.327	.547	.267				

The validity of the questionnaire items was assessed by correlating each item with the corresponding first principal component. The resulting coefficients indicate a satisfactory level of validity for all items, particularly those related to drug abuse. The reliability of the items was expressed through communalities, which represent a lower bound estimate of reliability, the actual reliability is likely higher. The reliability of the first principal component for the drug abuse variables was .899, while for the environmental risk factor variables it was .800 (Cronbach's α).

The discriminative validity of the questionnaire was examined by analysing the distribution shape of the total scores, with the hypothesis of deviation from normal distribution being rejected ($= .290$), indicating satisfactory discriminative power of the test as a whole (Fajgelj, 2009). Additionally, the discriminative capacity of individual items was assessed by correlating each item with the total questionnaire score, with the resulting coefficients confirming an adequate level of differentiation among respondents.

Data Analysis

Given that the criterion variables in this study are categorical in nature, canonical discriminant analysis was applied as the appropriate statistical technique. This method enables the identification of combinations of predictor variables that best distinguish groups of respondents based on their contact with drugs, i.e., users, dealers, and individuals with no contact with drugs.

RESULTS

To examine the significance of the discriminant functions, the analysis began with testing the significance of the canonical functions and their correlations (Table 2).

Table 2: Tests of importance of extracted canonical functions and their canonical correlations

Dependent Variable	Function	Eigenvalue ()	Variance Explained (%)	Canonical Correlation	Wilks lambda	Chi Squared	Df	p
Using drugs	1.	.510	100,0	.581	.563	251,621	84	.000
Drug distribution	1.	.173	100,0	.384	.853	64.37	29	.000

The results indicate that both discriminant functions are statistically significant ($p < .001$), confirming the appropriateness of further analysis. For the variable , the significant canonical correlation is 0.581, indicating a stronger effect of the discriminant function in differentiating between drug users and non-users. For the variable , the canonical correlation is 0.384. Although statistically significant ($p < .001$), its magnitude indicates a moderate effect of the discriminant function, suggesting that while there are significant differences between participants who have distributed drugs and those who have not, the influence of the predictors is weaker compared to the variable.

Further insight into the nature of the discriminant functions is provided through the standardized discriminant coefficients and the structure of the functions (Table 3).

Table 3: Standardized canonical discriminant coefficients and structure of canonical discriminant functions

	Using drugs		Drug distribution	
	Function 1		Function 1	
	Discrim. coef.	Struc. func.	Discrim. coef.	Struc. func.
Extraversion	-.461	-.197	-.343	-.102
Neuroticism	-.043	.131	-.083	-.030
Psychoticism	.115	.448	.438	.570
School performance	.146	.327	.157	.291
School punishments	.276	.542	.003	.320
Changing schools	.163	.413	.158	.330
Grades dropped suddenly	.169	.279	-.287	-.015
Not paying attention in classes	.129	.321	.111	.301
Not studying regularly	.092	.272	.151	.294



Not doing homework regularly	-.075	.229	.053	.266
Family relationships	.024	.071	.116	.227
Family members' attitude towards the student	.049	.227	.354	.432
Drugs and alcohol in the family	-.056	.142	-.202	.012
Crime within the family	.168	.262	.191	.286
Physical punishment in the family	-.019	.102	-.037	.155
Running away from home	.265	.509	.155	.326
Drugs and alcohol in the group of peers	.383	.472	.111	.323
Crime within the group of peers	.076	.372	.228	.399
Victim of bullying at school	.000	.348	-.293	.161
Victim of bullying outside of school	.139	.419	.097	.278
Victim of physical assaults at school	-.089	.186	-.320	.233
Victim of physical assaults outside of school	.138	.331	-.078	.214
Victim of boycott	.041	.210	.062	.187
Victim of mockery	-.169	.112	-.157	.014

The results of the canonical discriminant analysis indicate that drug users differ most notably from individuals who have not had contact with drugs in terms of personality traits, primarily psychoticism and extraversion as well as school-related behavioural problems, including disciplinary warnings, frequent school changes, and inattentiveness in class. In addition, the social environment plays a significant role, particularly the presence of drugs and alcohol among peers. Taken together, these factors suggest that personality, school problems, and the immediate social environment contribute to the risk of drug involvement.

Regarding drug distribution, psychoticism emerges as the most important differentiating factor, while family relationships, particularly negative attitudes of family members toward the student, running away from home, and peer group criminality, further contribute to distinguishing participants who are actively involved in drug distribution from those who are not. These results indicate that, in addition to personality, both family and peer contexts exert a strong influence on risky behaviour related to drug distribution.

Overall, the discriminant functions clearly differentiate drug users and distributors from participants who are not involved in these activities, with personality traits, the school environment, family relationships, and peer influences playing a key role in distinguishing these groups.

Table 4: *Centroids of the groups*

	Using drugs	Drug distribution
Group 1 (No drug use)	-.362	-.082
Group 2 (Drug use)	2.221	2.085

The analysis of group centroids on the canonical discriminant function further confirms the clear separation between respondents who have used or distributed drugs and those who have not.

Regarding the drug use criterion, the centroid for the group that did not use drugs is $-.362$, while the centroid for the group that did use drugs is significantly higher, at 2.221 . This difference indicates that the first discriminant function effectively separates the two groups, as the divergence in their mean

values along the discriminant axis is substantial and consistent with the patterns identified in the previous coefficient analysis.

A similar pattern is observed for the drug distribution criterion, where the group not involved in distribution has a centroid of $-.082$, while the group that did engage in distribution has a centroid of 2.085 . This also demonstrates a clear separation between the groups, further supporting the strong discriminative power of the first function. It confirms that the identified predictors — personality traits, school-related factors, family circumstances, and peer influences successfully differentiate individuals involved in the distribution of psychoactive substances from those who are not.

To assess the accuracy of the model in classifying respondents into the appropriate groups based on their responses to variables related to drug abuse, the following analysis was conducted, presented in Table 5.

Table 5: *Classification Accuracy – Actual and Predicted Group Membership*

Using drugs													
Forecasted belonging													
Actual belonging	Predicted affiliation						Actual belonging	Predicted affiliation					
	Group 1		Group 2		Total			Group 1		Group 2		Total	
	N	%	N	%	N	%		N	%	N	%	N	%
Group 1	396	97.3	11	2.7	407	100	Group 1	400	98.8	5	1.2	405	100
Group 2	27	56.2	21	43.8	48	100	Group 2	11	68.8	5	31.3	16	100
Other	2	/	1	/	3	/	Other	32	86.5	5	13.5	37	100
80% actual group members successfully classified							96.2% actual group members successfully classified						

The results of the classification performance analysis indicate a high accuracy of the model in predicting group membership. For the criterion 'drug use', 80% of actual group members were successfully classified, while for the criterion 'drug dealing', the classification accuracy was even higher, with 96.2% correct predictions. This indicates a good level of model accuracy in classifying respondents based on their answers.

DISCUSSION

The results of this study clearly highlight the significance of extraversion in distinguishing between adolescents who use drugs and those who do not. These findings are consistent with the majority of previous research (e.g., Soloff et al., 2000; Brook et al., 2000), but differ from the results of Spotts and colleagues (Spotts & Shontz, 1984), who identified introversion as a factor associated with the use of cocaine and opiates. Additionally, the findings partially diverge from those of Lovrić (2009), who emphasized the role of loneliness in differentiating drug users. It is important to note that experimenting with drugs is not equivalent to addiction, and that loneliness is not necessarily a reflection of introversion — it may result from stressful experiences, a lack of close relationships, feelings of alienation, or other factors (Rokach, 2000). Similar conclusions are supported by more recent research, such as the work of Efendić-Spačić and colleagues (2021), who found personality trait differences between heroin addicts and non-users, with addicts scoring lower on the extraversion dimension. Furthermore, Despotović et al. (2013), in their study on drug abuse among adolescents, emphasized the importance of psychological and social factors including personality in understanding youth drug use.



Extraversion also demonstrated a strong predictive value in the case of adolescents involved in selling, giving away, or lending drugs. Such behaviour naturally implies frequent and intense social interaction, pronounced impulsivity, and aggressiveness all of which are consistent with characteristics commonly associated with extraverted individuals (Eysenck et al., 1993; Conner et al., 2010; Giancola & Mezzich, 2003).

Psychoticism, as the second personality trait included in the analysis, showed a weaker but statistically significant predictive influence on drug use, while its correlation with the latent dimension was also significant. However, its contribution to distinguishing adolescents involved in drug distribution was considerably more pronounced, showing a strong correlation with the discriminative function. Traits associated with psychoticism, such as aggressiveness, emotional coldness, disregard for social norms, and a tendency toward risk-taking behaviour are directly aligned with behavioural patterns characteristic of drug dealing. These findings are consistent with previous research (Soloff et al., 2000; Šapić, 2008; Mitrović et al., 2006).

Neuroticism, the third personality trait examined, did not show a significant effect in differentiating adolescents who abuse drugs from those who do not. However, this finding should be interpreted with caution. The absence of a significant effect does not imply that neuroticism is irrelevant; rather, it may reflect limitations of the cross-sectional design, sample characteristics, or measurement methods. It is possible that cultural context, the developmental stage of the participants, or specific manifestations of neuroticism during adolescence influence its weaker association with drug use. Future research should examine these relationships in greater detail using longitudinal approaches and more differentiated measures of emotional instability (Hicks et al., 2004).

It is important to emphasize that the results of this study indicate associations rather than causal relationships between personality traits and drug-related behaviours. Given the cross-sectional design and the use of discriminant analysis, no conclusions can be drawn about the direct influence of extraversion and psychoticism on such behaviours. Instead, the findings suggest that these traits contribute to differentiating adolescents in terms of risky behavioural patterns, likely in interaction with environmental factors.

In addition to personality traits, environmental risk factors (Baić, 2018; Baić et al., 2015), also play a role in distinguishing adolescents based on behavioural patterns. In the case of drug use, the most significant predictor is the presence of drug addiction and alcoholism within the peer group, followed by disciplinary actions at school (e.g., formal warnings) and running away from home. When it comes to drug distribution, the influence of these factors diminishes, while greater impact is observed from poor family relationships with the adolescent and delinquent behaviour among peers. These findings are consistent with some previous studies by domestic authors conducted on similar populations (Radovanović et al., 2019; Radovanović et al., 2024). Additionally, certain victimization variables emerge as suppressors, highlighting the need for further research.

Particularly significant is the finding that drug addiction and alcoholism within the peer group is the strongest predictor of drug use (see Nevid et al., 2020), highlighting the need for this factor to be a central focus of systematic preventive interventions. On the other hand, in the case of drug distribution, the key factor is poor family relationships, including physical punishment, neglect, abuse, and other forms of negative treatment. These family circumstances are not significant predictors of drug use itself, as confirmed by low coefficient values, but they have a strong influence on the prediction of drug distribution.

This difference in the predictive power of peer and family environment factors points to the need for further research into environmental influences, in order to more precisely determine the mechanisms through which they operate and their specific roles in relation to different forms of drug abuse.

LIMITATIONS OF THE STUDY

A key limitation of this study lies in its exclusive reliance on self-reports and its focus on the adolescent population, without control for socially desirable responding (Oljača et al., 2018) and without a longitudinal perspective. Future research should incorporate longitudinal approaches, data from multiple sources (such as schools and families), and examine additional personal and environmental factors, in order to gain a deeper understanding of the complex interactions that lead to drug abuse.

CONCLUSION

The study showed that extraversion and psychoticism are key personality traits that differentiate adolescents who engage in drug abuse from those who do not, which is consistent with recent findings by Escamilla et al. (2024). Extraversion emerged as a significant predictor of both drug use and distribution, while psychoticism was particularly associated with drug distribution. Neuroticism did not prove to be relevant in explaining drug abuse in this sample.

Environmental factors, particularly those related to peer groups (e.g., drug addiction, alcoholism, delinquency), as well as family and school-related factors (e.g., running away from home, poor family relationships, disciplinary problems at school) (Sullivan & Rudisill, 2012), demonstrated significant predictive power. Personality traits did not serve as mediators in the relationship between environmental factors and adolescent behaviour.

The findings obtained apply exclusively to the adolescent population and cannot be automatically generalized to other age groups. However, considering that adolescence represents a critical period for the initiation of drug abuse (Radovanović, 2010), the results of this study provide a valuable foundation for the development of targeted prevention programs.

Preventive implications point to the need for school-based programs that strengthen positive peer relationships, social skills, and resilience to peer pressure in order to reduce the risk of drug abuse. Family interventions should promote improved communication, emotional support, and supervision of adolescents. At the public policy level, the development of integrated strategies connecting schools, families, and communities is recommended to enable early identification and support of at-risk adolescents, thereby reducing both drug use and distribution among youth.

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CONTEMPORARY CRIME TRENDS AND THE ETIOLOGY OF CRIMINAL BEHAVIOUR IN THE CONTEXT OF GLOBAL CRISES

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ABSTRACT

Purpose: This paper aims to explore how global crises, particularly the COVID-19 pandemic and the processes of globalization, have influenced the structure, frequency, and nature of contemporary forms of crime. The focus is on identifying aetiological factors behind the rising trends in specific types of crime, such as domestic violence, cybercrime, and transnational organized crime.

Design/Methods/Approach: The study applies a qualitative methodology rooted in criminological theory, supported by analysis of secondary data and international reports. A multidisciplinary perspective is adopted to contextualize the societal, economic, and psychological triggers of modern criminal behaviour.

Findings: The COVID-19 pandemic triggered a marked increase in domestic violence, largely due to imposed isolation, financial hardship, and stress. Parallel to this, cybercrime spiked globally, exploiting digital dependency during lockdowns. Additionally, globalization facilitated the expansion of transnational criminal networks that exploit legal loopholes and operate beyond national jurisdictions.

Originality/Value: This paper offers a timely and comprehensive analysis of how macro-social stressors contribute to criminal behaviour, reinforcing the importance of responsive, adaptive, and socially-aware criminal justice policies. The findings serve legal scholars, policymakers, and practitioners aiming to modernize prevention strategies and develop more holistic models of criminal justice in times of systemic disruption.

Keywords: contemporary crime, aetiology, global crises, COVID-19, cybercrime, transnational crime

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PURPOSE

The twenty-first century has been marked by an intense interplay of global crises that have fundamentally reshaped the fabric of contemporary societies. From the rapid spread of pandemics, such as

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COVID-19, to prolonged economic recessions, political instability, technological disruption, and the far-reaching consequences of globalization, these systemic upheavals have not only challenged governance structures and public health systems but have also had a profound impact on the configuration and prevalence of criminal behaviour.

Criminality, as a social phenomenon, is deeply intertwined with broader structural conditions. In moments of crisis, when institutions are strained and individual resilience is tested, crime often evolves both in form and function. As scholars such as Garland (2001) and Bauman (2000) have pointed out, contemporary society, under the conditions of what they term “late modernity”, is particularly susceptible to the emergence of new forms of deviance due to growing uncertainty, insecurity, and social disintegration. In this context, crime can be interpreted as both a symptom and a consequence of broader structural turbulence.

This paper seeks to explore how global crises, most notably the COVID-19 pandemic and the processes of globalization, have transformed the structure, frequency, and nature of criminal offenses, with particular focus on three paradigmatic manifestations: domestic violence, cybercrime, and transnational organized crime. These categories were not chosen arbitrarily; rather, they represent the convergence of micro-level victimization and macro-level criminal networks, encompassing both interpersonal and systemic forms of deviance that have intensified in recent years.

The core objective of the study is to analyse the aetiological dimensions of these crime forms, identifying both proximal and distal causes, including socio-economic pressures, psychological distress, institutional failures, digital dependency, and the erosion of territorial boundaries. Such an analysis is necessarily multidisciplinary, drawing on criminological theories (e.g., strain theory, routine activity theory, globalization theory), legal frameworks, public health data, and sociological insights.

In doing so, the paper aspires to contribute to a more adaptive and socially-responsive criminal justice model, one that is capable of operating effectively in the face of systemic disruption. In times of global instability, criminal justice institutions must transcend reactive models of repression and punishment and instead embrace anticipatory, integrative, and rehabilitative strategies that align with human rights standards and international best practices (UNODC, 2021; Council of Europe, 2020).

Through a combination of theoretical grounding, empirical data, and comparative analysis, the paper ultimately proposes *de lege ferenda* recommendations aimed at enhancing the resilience and responsiveness of legal systems. These recommendations are intended not only to address the immediate challenges of crisis-induced criminality but also to foster long-term transformation in how societies understand, prevent, and respond to crime in the context of globalization and instability.

DESIGN/METHODS/APPROACH

This study is based on a qualitative methodological framework that combines legal and criminological analysis with insights from related social sciences. The research primarily employs normative analysis to examine the evolution of international legal standards and national criminal legislation in response to contemporary crime trends. In addition, a comparative method is applied to explore how different jurisdictions have reacted to the rise of crisis-related forms of criminality, particularly in areas such as domestic violence, cybercrime, and transnational organized crime.

To provide a deeper understanding of individual and collective behaviour under conditions of systemic stress, the study draws on sociological and psychological interpretation, especially in relation to social disintegration, digital dependency, and the erosion of protective institutions. The empirical basis of the research is supported by secondary sources, including official statistical data and reports



from international organizations such as UNODC, Interpol, Europol, and UN Women, as well as relevant academic literature.

The paper is structured around three interconnected thematic areas, each representing a key challenge to contemporary criminal justice systems: private sphere violence, cyber-enabled criminality, and globalized criminal networks. This structure allows for a focused yet integrated analysis of how global crises shape the nature and aetiology of modern crime.

GLOBAL CRISES AND THE CRIMINOGENIC CONTEXT

To what extent do global crises function as catalysts for crime, and how do they reshape the sociological foundations of deviant behaviour?

This question lies at the heart of contemporary criminological inquiry, particularly in the wake of systemic disruptions such as the COVID-19 pandemic and the intensified processes of globalization. Both phenomena, though different in origin, have acted as profound stressors on the structural and normative stability of societies, thus altering the context in which criminal behaviour emerges and evolves.

Criminology has long emphasized the role of macro-social stressors in generating conditions conducive to deviance. From Robert Merton's anomie theory (1938) to Agnew's General Strain Theory (1992), scholars have identified how systemic inequalities, institutional failures, and blocked opportunities produce psychological tension and social disintegration, fertile ground for various forms of criminal behaviour. Similarly, Bauman (2000) highlights the consequences of "liquid modernity", where traditional social anchors, such as stable employment, family structures, and institutional trust, are increasingly eroded, leaving individuals exposed to insecurity and moral ambiguity.

The COVID-19 pandemic presented an acute manifestation of these theoretical frameworks in practice. As a global health crisis, it triggered a cascade of socioeconomic consequences: mass unemployment, disruptions in public services, limitations on mobility, and an overwhelming psychological toll on individuals and communities. These conditions created what some scholars term a "criminogenic crisis environment", one in which both motivation for crime (due to need or distress) and opportunity for crime (due to weakened surveillance or institutional paralysis) were simultaneously increased (UNODC, 2021).

At the same time, the ongoing dynamics of globalization, though not a sudden crisis in the same sense as the pandemic, constitute a chronic source of normative dislocation. Global flows of capital, goods, information, and people have produced not only economic interdependence but also jurisdictional ambiguity, legal asymmetries, and institutional vulnerabilities. As Beck (2002) argues in his theory of the "risk society", modern societies are increasingly characterized by transnational threats that escape the regulatory capacities of the nation-state, among which transnational crime is particularly prominent.

These global transformations have altered the traditional boundaries of crime control. National legal systems, rooted in territorially defined sovereignty, struggle to respond effectively to cross-border criminal phenomena, such as cybercrime, human trafficking, and international financial fraud. Meanwhile, domestic institutions (police, courts, social services) are often overburdened or structurally unprepared for the multidimensional nature of crisis-induced crime.

In both pandemic and globalization contexts, key criminogenic factors have been amplified. These include:

- **poverty and economic marginalization**, as a result of job loss and market disruption;
- **psychological instability**, fuelled by uncertainty, fear, and isolation;
- **social fragmentation**, as collective rituals and community networks were interrupted;



- **institutional fragility**, with delays in legal procedures, reduced protection services, and emergency governance mechanisms that sometimes deprioritize rights-based approaches.

Thus, global crises do not merely correlate with rising crime rates; they transform the very conditions under which crime is defined, motivated, and enacted. They also challenge the effectiveness of traditional criminological and legal categories, pushing scholars and practitioners alike to rethink how deviance is produced and how justice systems can respond in a way that is both efficient and ethically sustainable.

As a result, one must ask not only how crime increases during crises, but which crimes increase, why they increase, and how state and non-state actors can respond without compromising human rights, procedural fairness, or long-term social cohesion. These are the questions that will define the future of criminology and criminal law in an age of recurring global disruption.

Anticipated climate migration and technological disruption align with Agnew's (1992) framework of generalized strain, as future shocks may create mass psychosocial tension conducive to criminal adaptation.

DOMESTIC VIOLENCE DURING THE COVID-19 PANDEMIC

One of the most disturbing and immediate social consequences of the COVID-19 pandemic was the global surge in domestic violence, particularly gender-based violence against women and children. As governments around the world imposed lockdowns and movement restrictions to contain the virus, many victims found themselves effectively confined with their abusers, isolated from support networks, and cut off from access to protective services.

The phenomenon has been widely described as an "epidemic within the pandemic" (Van Gelder et al., 2020), revealing the extent to which private spaces, traditionally viewed as sanctuaries, can become environments of control, coercion, and violence in the absence of institutional visibility. According to UN Women (2020), more than 30% of women worldwide experienced increased violence in the first six months of the pandemic, a pattern echoed across continents. In Serbia, civil society reports and media outlets have indicated a noticeable increase in domestic violence incidents during the early phase of the COVID-19 pandemic, especially following lockdown measures (Autonomous Women's Center / WomenNGO, 2020).

To understand the criminogenic nature of this escalation, it is crucial to explore the etiological dimensions underlying this form of violence. Firstly, the enforced isolation created conditions that allowed perpetrators to exert sustained and unchecked psychological, physical, and economic control. The absence of third-party observers, such as teachers, employers, social workers, or neighbours, meant that early warning signs often went unnoticed and unreported (Peterman et al., 2020).

Secondly, the economic fallout of the pandemic served as a critical aggravating factor. Job losses, income insecurity, and the collapse of informal labour markets disproportionately affected lower-income households and exacerbated pre-existing stressors within the family unit. Research indicates that financial stress can directly correlate with increased incidences of intimate partner violence, as it undermines traditional power dynamics and coping mechanisms, particularly in patriarchal societies where economic control is often entangled with male identity (Van Daalen et al., 2020; EIGE, 2021).

A third, and equally significant factor, was the reduction in institutional protection mechanisms. Courts operated at reduced capacity, often delaying or suspending hearings on protection orders. Shelters faced limitations due to social distancing protocols and budgetary constraints. Many non-governmental organizations and victim support services were forced to move online, rendering their services



inaccessible to victims with limited digital literacy or access to private internet-connected spaces. This “digital gap” had a disproportionately negative effect on rural women, ethnic minorities, and individuals with disabilities, compounding their marginalization in an already exclusionary system (Fraser, 2020). Legal scholars have further highlighted how access to justice during lockdowns was undermined by the technological mediation of protective measures and the limited readiness of judicial systems (Tešović & Milovanović, 2022).

In addition to these structural issues, the psychosocial environment of the pandemic must be considered. Heightened anxiety, loss of routine, substance abuse, and a general atmosphere of fear and uncertainty created a fertile psychological terrain for aggressive behaviour. Studies in crisis psychology suggest that when individuals feel a loss of control in the external environment, they may attempt to assert dominance within their immediate surroundings, often targeting those most vulnerable (WHO, 2020).

What emerges, therefore, is a multidimensional aetiological matrix in which domestic violence during the COVID-19 pandemic cannot be attributed to a single factor, but rather to the intersection of personal, structural, and institutional vulnerabilities intensified by crisis conditions. This reality calls into question the adequacy of the existing criminal justice mechanisms to respond to violence in private spaces during public emergencies. The pandemic has demonstrated that domestic violence is not merely a private issue, but a public concern with far-reaching social and legal implications.

Consequently, post-crisis criminal justice reform must address these gaps by reinforcing integrated victim protection frameworks, enhancing the accessibility and resilience of support services, and adopting emergency protocols that preserve the visibility and priority of domestic violence cases, even during times of broader systemic disruption. Only by recognizing the structural roots of such violence can legal systems respond in a manner that is both immediate and transformative.

CYBERCRIME AND THE DIGITALIZATION OF CRIMINAL BEHAVIOUR

The COVID-19 pandemic catalysed an unprecedented acceleration in the digitalization of everyday life. Virtually overnight, societies across the globe migrated critical activities, including work, education, healthcare, commerce, and social interaction, into digital environments. While this shift was necessary for the continuation of public and private functions under lockdown conditions, it also created an expansive and largely unprotected terrain for cybercriminal activity. This transformation did not merely amplify the existing cybercrime trends but significantly restructured the opportunity landscape in ways that favoured rapid criminal adaptation. As Wall (2007) argues, cybercrime is not merely an online version of conventional crimes, but a fundamental transformation in the structure and scope of criminal opportunity in the information age.

Interpol notes that the pandemic’s rapid shift of work, education, and services online coincided with a sharp rise in phishing, ransomware, identity theft, and online child sexual exploitation, especially in early 2020–2021 (Interpol, 2021). The speed and breadth of this growth reflect both the increasing sophistication of offenders and persistent preparedness gaps across public institutions and end users.

From a theoretical perspective, these developments are well-explained by Routine Activity Theory (Cohen & Felson, 1979), which posits that crime occurs when three elements converge in time and space: a motivated offender, a suitable target, and the absence of a capable guardian. The pandemic disrupted normal routines and replaced them with new digital habits, working from home, remote schooling, telemedicine, thereby increasing the exposure of individuals and organizations to online threats. Motivated offenders, ranging from lone hackers to transnational cybercrime syndicates, ex-



exploited the expanded presence of vulnerable targets, including children, the elderly, small businesses, and under-resourced public bodies. Simultaneously, the absence of capable guardianship, such as robust cybersecurity infrastructure, digital literacy, or real-time institutional monitoring, created ideal conditions for exploitation.

One particularly alarming trend was the dramatic rise in ransomware attacks on hospitals and health systems, where criminals targeted critical infrastructure during peak pandemic pressure. These attacks posed not only financial risks but also direct threats to human life, delaying patient care and endangering sensitive data (Europol, 2020). Additionally, online child exploitation cases surged, as children spent more unsupervised time online and predators took advantage of closed schools, reduced law enforcement capacity, and increased psychological vulnerability among minors (UNICEF, 2020).

The abrupt transition to digital workspaces exposed profound cybersecurity gaps, particularly among small and medium enterprises (SMEs), educational institutions, and non-governmental organizations. With limited technical capacity and financial resources, many became vulnerable entry points for wider criminal networks. This vulnerability was compounded by the jurisdictional complexity of cybercrime enforcement, as the transnational nature of online activity outpaces domestic legal systems. European cybersecurity agencies have further highlighted the susceptibility of SMEs and public sector systems, especially in healthcare and education, which experienced surges in phishing, ransomware, and supply-chain attacks (ENISA, 2022).

In light of these patterns, the pandemic revealed that digital environments are not merely neutral spaces of communication and productivity, they are contested arenas of power, vulnerability, and criminal opportunity. Cybercrime, in this context, should not be understood solely as a technological issue, but as a socio-legal phenomenon that intersects with broader questions of inequality, governance, and institutional resilience.

As digital dependency becomes a permanent feature of modern life, it is imperative that criminal justice systems evolve accordingly. This includes the development of specialized cybercrime units, cross-border legal cooperation, public-private partnerships in cybersecurity, and the integration of digital literacy into national education curricula. Moreover, future crisis preparedness plans must anticipate digital vulnerabilities as critical points of national and human security.

TRANSNATIONAL ORGANIZED CRIME IN THE ERA OF GLOBALIZATION

Globalization, while widely celebrated for facilitating economic integration and cross-cultural exchange, has also created an environment ripe for the expansion and entrenchment of transnational organized crime (TOC). The very mechanisms that enable the legal movement of goods, people, services, and capital across borders - open markets, digital connectivity, and the reduction of regulatory barriers - have simultaneously been co-opted by criminal networks to expand their operations on a global scale.

According to the United Nations Office on Drugs and Crime (UNODC, 2020a, 2020b), TOC has evolved into a complex, adaptive, and networked phenomenon, exploiting jurisdictional asymmetries and institutional vulnerabilities between states. The contemporary transnational criminal landscape includes a wide array of illicit activities such as drug trafficking, human trafficking, arms smuggling, wildlife and environmental crimes, counterfeit goods, and large-scale money laundering. These crimes often intersect with other forms of corruption, political instability, and armed conflict, creating what scholars refer to as "grey zones" of governance where state and non-state actors collude or compete for control over territory and resources (Cockayne, 2016).



One of the key transformations in TOC under globalization is the increasing sophistication and decentralization of criminal organizations. Traditional hierarchical structures have given way to fluid, networked formations that are far more resilient and difficult to dismantle. These groups leverage emerging technologies, including end-to-end encrypted communication platforms, cryptocurrency transactions, and operations on the dark web, to evade detection, obfuscate financial trails, and coordinate transnational operations in real time (Europol, 2020).

This technological infrastructure has become a crucial component of TOC's adaptability. The intersection of technological innovation and criminal justice also raises critical challenges in the protection of witnesses and procedural fairness when using remote tools in organized crime trials (Tešović & Milovanović, 2022). For example, during the COVID-19 pandemic, organized criminal groups quickly diversified their activities into areas such as counterfeit medical products, online fraud related to vaccine registration, and exploitation of supply chain disruptions, illustrating a capacity for rapid strategic realignment in response to global events (UNODC, 2021).

Moreover, legal and regulatory asymmetries between national jurisdictions continue to provide safe havens for illicit financial flows and the relocation of operations. While one country may impose strict anti-money laundering controls or criminalize certain activities, others may offer weak enforcement, permissive laws, or outright complicity from corrupt officials. This fragmented global legal landscape enables TOC groups to "forum shop" for the most favourable operational conditions (Shelley, 2014). In many cases, organized criminal groups strategically invest in legitimate businesses, using them as fronts for money laundering, corruption, and market manipulation (Savona & Riccardi, 2015).

From a criminological standpoint, the globalization of organized crime aligns with Zygmunt Bauman's concept of liquid modernity, in which institutions and norms struggle to maintain coherence in the face of constant movement, uncertainty, and transnational complexity (Bauman, 2000). Simultaneously, Manuel Castells (2010) conceptualizes criminal networks as "perverse connections" within global flows, entities that mirror, exploit, and even depend on legal systems of exchange, while operating outside their normative frameworks.

Furthermore, TOC does not merely threaten public safety; it also undermines democratic governance, erodes trust in institutions, and fuels systemic inequality. In regions where state capacity is weak or contested, criminal organizations often assume quasi-governmental roles, providing services, enforcing rules, and even distributing food or healthcare, as documented in Latin America, parts of South-east Asia, and West Africa. Armed conflicts and state collapse often provide fertile ground for illicit economies to thrive, creating feedback loops between violence and organized crime (Global Initiative Against Transnational Organized Crime, 2022). Such dynamics blur the boundaries between criminality and governance, complicating both enforcement and policy responses.

Addressing TOC in the context of globalization requires more than cross-border policing, it demands a coordinated, multilateral legal and policy framework, grounded in mutual legal assistance, harmonization of criminal codes, transparency in financial systems, and sustained investment in institutional capacity building. Equally important is the inclusion of preventive strategies that target the socioeconomic root causes, such as poverty, displacement, and political exclusion, that render populations vulnerable to recruitment, trafficking, and exploitation.

In sum, the globalization of crime reflects the darker side of an interconnected world, where criminal actors are often more agile and cooperative than the legal systems meant to contain them. A resilient response requires not only innovation and cooperation, but a paradigm shift in how law enforcement, policy-makers, and international institutions conceptualize sovereignty, justice, and transnational responsibility.



ETIOLOGICAL FACTORS

The expansion and persistence of transnational organized crime (TOC) cannot be understood solely through its visible manifestations, such as trafficking networks or illicit markets, but must be analysed in relation to the deeper etiological structures that sustain it. These root causes are not accidental by-products of globalization, but systemic consequences of political, economic, and legal asymmetries that define the contemporary international order.

First and foremost, the weakness of state institutions, particularly in developing or transitional countries, plays a critical role in enabling transnational organized crime (TOC). Where law enforcement agencies are underfunded, politically manipulated, or lacking technical expertise, organized groups often operate with virtual impunity. Such fragile contexts create what criminologists describe as “zones of criminal opportunity”, where the absence of credible state authority allows non-state actors to impose their own systems of order, typically backed by violence or patronage networks (Williams, 2009).

At the same time, the rapid expansion of digital environments has generated new forms of vulnerability. Online spaces not only increase opportunities for cyber-offenders but also reshape victim-offender dynamics and trigger distinctive social reactions. As Ilić et al. (2025) observe, the interplay of formal legal responses and informal community reactions to digital crime underscores the complexity of governing security in an era where traditional state mechanisms are often outpaced by technological change.

Closely related to institutional weakness is the lack of effective legal enforcement mechanisms. In many jurisdictions, laws related to money laundering, asset forfeiture, or mutual legal assistance remain either inadequate or inconsistently applied. Procedural bottlenecks, corruption within the judiciary, and limited international cooperation all contribute to the failure to dismantle complex criminal networks, even when their operations are well-documented.

Another critical factor is the persistence of global economic disparities, which serve as structural drivers of illicit markets. The disparity between global labour supply and demand, particularly in sectors such as agriculture, construction, domestic work, and sex work, creates a continuous push-pull dynamic. Recent scholarship has emphasized that these dynamics are further complicated by penal policies that disproportionately affect foreign nationals, revealing deeper patterns of systemic exclusion and inequality within European justice systems (Tešović & Bodrožić, 2025). Individuals from impoverished or conflict-affected regions are “pushed” by lack of opportunity, while wealthier destination countries “pull” through demand for cheap, unregulated labour. TOC groups exploit this economic imbalance by offering “services” such as illegal migration routes, forged documents, and debt-based labour arrangements, often leading to situations of modern slavery or human trafficking (ILO, 2022).

Corruption at multiple levels of governance further entrenches TOC. Whether through bribery of border officials, collusion with customs agencies, or infiltration of political parties, organized criminal groups routinely manipulate state structures to protect their interests. This symbiotic relationship between organized crime and political power undermines democratic accountability and obstructs reform efforts (Shelley, 2014). In some cases, entire regions operate under a hybrid order where criminal and state actors co-govern, blurring the boundaries between legality and illegality.

Equally problematic is the lack of harmonization in criminal law and enforcement standards across jurisdictions. What may constitute a serious offense in one country may be treated as a regulatory infraction in another, leading to “safe havens” for illicit operations and financial flows. The absence of standardized procedures for extradition, data sharing, asset recovery, and joint investigations hampers transnational prosecutions and weakens the global rule of law. This legal fragmentation is further



complicated by digital and financial technologies, which allow criminal organizations to transcend national controls while remaining legally obscured.

Taken together, these factors illustrate that the success of transnational organized crime is not simply a failure of law enforcement, but a symptom of structural deficiencies within the global system itself. The adaptability of criminal networks is not a reflection of their sophistication alone, but also of the strategic vulnerabilities within and between states. Addressing these issues requires more than policy adjustments; it demands a fundamental rethinking of sovereignty, development, and justice in a globalized context.

RESILIENCE-ORIENTED CRIMINAL JUSTICE FRAMEWORK

The COVID-19 pandemic revealed systemic fragilities within global criminal justice systems, underscoring the necessity for a shift toward resilience-oriented frameworks. Rather than merely reacting to crises, institutions must be structurally equipped to adapt to disruption while maintaining core legal functions. The role of artificial intelligence in crime detection and prevention is expanding, but it also raises new questions regarding transparency, accountability, and ethical use of predictive tools (Europol & UNICRI, 2023).

A proposed model of judicial resilience would rest on four pillars: legal adaptability, institutional flexibility, digital capacity, and transnational interoperability. These dimensions enable continuity of justice through mechanisms such as remote court access, emergency legal provisions, integrated victim protection services, and automated international cooperation protocols (Boin & van Eeten, 2013; UNODC, 2021).

For example, countries like Estonia and the Netherlands demonstrated higher resilience due to pre-existing e-justice systems and flexible legal mechanisms that remained operational under lockdown conditions. This model aligns with broader public management literature advocating for institutional robustness in the face of complex risks (Boin & Van Eeten, 2013).

COMPARATIVE INSIGHTS AND GOOD PRACTICES

While global crises have exposed systemic vulnerabilities in both domestic and transnational contexts, certain jurisdictions have demonstrated notable success in mitigating criminogenic pressures through proactive and adaptive strategies.

In New Zealand, a coordinated multi-agency task force, comprising police, social workers, and health services, was established to respond to increased family violence reports. This integrated response model contributed to a 12% decrease in repeat domestic violence cases during the 2020 lockdown compared to the same period in 2019 (New Zealand Police, 2020).

In Canada, the federal government expanded emergency funding for women's shelters and established mobile legal aid units, enabling victims in isolated rural areas to access protection mechanisms during lockdowns (Government of Canada, 2020).

In France, innovative community-based tools were introduced, including the "Mask 19" code-word in pharmacies and SMS emergency lines, allowing victims to discreetly report abuse (EIGE, 2021). Similarly, Serbia's judiciary undertook important steps in building remote trial capacities, setting out frameworks and practical models to support digital court infrastructure during and beyond the pandemic period (Krstić et al., 2021).



With regard to cybercrime, Singapore's Cyber Security Agency (CSA) launched real-time public education campaigns and partnered with internet service providers to block malicious domains at the infrastructure level. These initiatives resulted in a 23% drop in successful phishing and ransomware attacks during the third quarter of 2020 (CSA Singapore, 2021).

Collectively, these examples highlight the importance of early inter-institutional coordination, flexible funding, and community-based empowerment mechanisms in buffering systemic risks during crises.

FINDINGS

This research confirms that global crises function as powerful criminogenic catalysts, reshaping both the manifestation and structure of criminal behaviour. The COVID-19 pandemic and the wider processes of globalization have not only intensified the existing vulnerabilities within societies but have also created new spatial, technological, and institutional arenas for deviance to emerge. These developments do not occur in isolation but are embedded within broader patterns of structural tension, institutional fragility, and legal fragmentation.

The first major finding relates to the dramatic escalation of domestic violence, particularly intimate partner violence, during pandemic-related lockdowns. Psychological stress, economic insecurity, prolonged isolation, and a collapse in institutional accessibility, particularly to courts, shelters, and victim support services, collectively contributed to what global institutions have termed an "epidemic within the pandemic". This form of violence emerged not simply as a personal pathology but as a predictable outcome of systemic crisis mismanagement, where the private sphere became both a site of victimization and institutional neglect.

Secondly, the research highlights a surge in cybercrime, closely tied to the rapid and often unregulated expansion of digital life. As work, education, and social interaction migrated online, so did criminal activity, too. The increase in phishing schemes, ransomware attacks, digital fraud, and online exploitation underscores how digital environments, particularly in times of crisis, become amplifiers of pre-existing inequalities and security gaps. These crimes disproportionately targeted individuals and institutions unprepared for the shift, revealing the critical importance of cybersecurity as both a technological and legal priority.

The third key finding concerns the evolution of transnational organized crime (TOC) in the context of globalization. Contemporary TOC groups no longer operate as static, territorially bounded entities; rather, they function as fluid, adaptive, and networked systems capable of navigating and exploiting the asymmetries of the global order. They leverage encrypted communication, cryptocurrency, and legal loopholes to maximize profit and avoid detection, often moving faster than the institutions tasked with their containment. Their operations thrive in environments marked by regulatory inconsistency, political corruption, and fragmented international cooperation.

Across these three domains, domestic violence, cybercrime, and TOC, a common aetiological thread emerges: the presence of structural strain, whether economic, legal, social, or psychological, compounded by institutional incapacity to respond swiftly and effectively. These findings validate the insights of strain-based and routine activity theories, while also calling attention to the inadequacy of conventional criminal justice models in dealing with crisis-related crime.

Crucially, the research reveals that crime during global crises is not simply a matter of individual deviance, but a symptom of systemic dysfunction, shaped by overlapping layers of inequality, governance failures, and technological disruption. As such, policy responses must transcend the limits of reactive law enforcement. What is needed is an interdisciplinary, preventive, and resilience-based approach,



grounded in international cooperation, legal harmonization, and investment in the structural capacities of institutions most vulnerable during times of disruption.

These findings form the basis for the *de lege ferenda* considerations proposed in the final section of this paper, which aim to translate empirical and theoretical insights into actionable strategies for criminal law reform and institutional modernization.

ORIGINALITY/VALUE

This paper makes a distinctive contribution to contemporary criminological and legal scholarship by framing criminal behaviour as a structural response to global crises. It bridges theory, empirical insight, and policy analysis through a nuanced integration of classical and modern frameworks, such as strain theory, routine activity theory, and globalization theory, with the real-time dynamics of the COVID-19 pandemic and accelerated globalization.

A key innovation lies in its etiological approach, which moves beyond surface-level descriptions to uncover the structural, psychological, and institutional forces that drive deviance during systemic disruptions. By examining domestic violence, cybercrime, and transnational organized crime as interconnected outcomes of social stress and institutional breakdown, the paper offers a multidisciplinary lens for interpreting crime in the 21st century.

Comparative insights further enrich the analysis. Juxtaposing international practices with national and regional case studies, particularly from Serbia, the paper highlights both successful models and structural blind spots, showing how legal systems adapt, resist, or reflect global pressures.

Normatively, the study advocates for a paradigm shift in criminal justice: one that prioritizes adaptability, resilience, and social responsiveness. It calls for rethinking state responsibility in preventing domestic violence, reinforcing cybersecurity governance, and harmonizing legal frameworks to tackle transnational crime.

By situating crime within broader socio-political transformations, the paper challenges traditional, individualistic views of deviance and invites interdisciplinary dialogue, critical reflection, and systemic reform across legal and policy domains.

CONCLUSION AND POLICY RECOMMENDATIONS

The analysis confirms that global crises, such as the COVID-19 pandemic and intensified globalization, act as catalysts for both the emergence and transformation of criminal behaviour. These disruptions have particularly magnified domestic violence, enabled the proliferation of cybercrime, and facilitated the expansion of transnational organized crime networks.

What unites these phenomena is the presence of structural strain and institutional inertia. Socio-economic instability, legal asymmetries, and technological vulnerabilities have created criminogenic conditions that challenge conventional criminal justice mechanisms.

In response, legal systems must evolve through:

1. **Integrated, interdisciplinary policies** that address the root causes of crime during crises.
2. **Strengthening institutional resilience**, particularly in digital infrastructure and victim support services. According to the World Economic Forum (2022), building global cyber-resilience requires multi-stakeholder collaboration, especially in the face of emerging hybrid threats and digital dependency.



3. Modernizing legal frameworks to enhance cross-border cooperation and regulate emerging forms of cyber-enabled and globalized crime.

Ultimately, adaptive, human-centred, and preventive approaches must replace reactive legal models to ensure justice and safety in a rapidly changing world. Comparative models such as problem-solving courts illustrate how integration of therapeutic practices and accountability mechanisms can reinforce social rehabilitation and institutional legitimacy during systemic crises (Tešović, 2024). This perspective supports a broader movement toward community-oriented justice that fosters trust through transparency, inclusion, and institutional legitimacy (Tešović, 2025).

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MOTOR VEHICLE ATTACKS ON CHRISTMAS MARKETS IN THE EU: POLITICAL HOMICIDE, ORGANIZED TERRORISM OR LONE WOLF TERRORISM

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ABSTRACT

Purpose: The aim of our research is to provide the scientific and professional community with a contribution to explaining the occurrence of deadly attacks on civilians attending Christmas markets in the European Union. To fully achieve this goal, we will need to determine whether the aforementioned events fit the definition of political homicide, terrorism by organizations, or terrorism by individual perpetrators.

Design/methods/approach: Our paradigmatic approach to this research subject will be based on the political theory in the field of terrorism studies. We will use theoretical axioms from the field of political violence and the classification of terrorist organizations according to the actor criterion. We will use analysis as the basic analytical method, especially explanatory analysis. Scientific explanations of individual events will be carried out through case studies. Data collection will be carried out from open sources of information.

Findings: The outcome of this research will provide the professional and scientific community with another basis for creating policy papers in this area.

Originality/Value: The justification and value of the research stems from the outcome of the research, which is the creation of preconditions for more efficient prevention of terrorist acts that are the subject of this research. The scientific and social contribution is reflected in raising the awareness of the scientific and social community about the correct political qualification of the criminal act, from which adequate legal qualification can later result, and then adequate application of security measures.

Keywords: Christmas markets, political homicide, Jihadism, Terrorism

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INTRODUCTION

Given that terrorism is a dynamic phenomenon, it is not surprising that new forms of terrorist activities are emerging as new regularities in terrorist activities. Accordingly, it is the task of researchers in this field to constantly monitor this phenomenon in practice and make corrections to theoretical concepts so that they are useful for practical use. In other words, science must, in its constant vigilance, provide new answers and instructions for the fight against terrorism whenever the opportunity arises. Having noticed the deficit of scientific literature on the topic of attacks on Christmas markets in the EU, and primarily in Germany and France, we decided to make a contribution in the form of a scientific explanation, scientific classification, but also scientific prediction regarding this specific, recurring form of terrorist attacks. Considering that after 2022, the EU's energy security is at risk, and at the same time, sustainable development has a direct correlation with security issues (Trbojević, Jovanović, Đurđević, 2024), we believe that there is research space in other areas of security, such as the challenges that terrorism may pose to the European Union in the future.

The theoretical paradigm within which we will conduct this analysis is terrorism studies. Our research goal is to determine the form of political violence in question and to describe it, then to adequately classify it, and finally, through a concluding discussion, to provide recommendations for the fight against this form of terrorism that has become a December regularity in European cities.

The research question we pose is: To which forms of political violence do attacks on Christmas markets belong and what are their main characteristics? Our basic hypothesis is based on the assumption that these are: terrorist, religiously-founded, jihadist conventional attacks carried out by individuals and organized groups, in which the means of attack is a motor vehicle, and the method of attack is driving a vehicle into large groups of people, with the aim of committing mass political homicide according to the doctrine or openly in the name of the "Islamic State".

To demonstrate that our hypothesis is correct, we will present the characteristics of political homicide, terrorism, and explain certain classifications of terrorism. We will then explain the political context of these attacks, in order to then provide a detailed overview of specific, selected events in which attacks on Christmas markets occurred in certain cities in France and Germany, as the European Union countries that have suffered by far the largest number of such attacks. Finally, we will draw conclusions that will be useful to members of national security services.

The conclusions we reach in the described manner will also have their social justification for this scientific research, if we start from the premise that the need to secure the life of both the individual and society is the fundamental interest of every person. (Jovanović, 2021)

POLITICAL HOMICIDE

According to Dragan Simeunović, "political homicide can be defined most briefly as the ideologically, or politically motivated, complete and permanent physical elimination of a real, potential or presumed political opponent as a form of sanction for his political convictions or activities, but also preventively." (Simeunović, 1989: 103)

The basic classification divides political homicide into individual and mass according to the criterion of the number of victims. Mass political homicide can also appear as a megacide, which is always necessarily an institutionalized activity, individual political homicide can be committed by an institution, group or individual. (Simeunović, 1989: 104)



It is important to distinguish between political homicide and assassination, and in this sense Simeunović says that “not every political homicide is the result of an assassination, nor does every assassination end in homicide. The first important, logical difference between political homicide and assassination is that in addition to successful ones, there are also unsuccessful assassinations, which of course cannot be the case with political homicide, and the second is that assassination implies endangering a relatively important political figure, which is not necessarily and does not have to be the case when committing and defining political homicide, and therefore we can define assassination as a specific violent way of committing or attempting political homicide. Third, assassination implies endangering the life of one person or a relatively small number of persons, while political homicide can also have mass proportions... Then, the concept of assassination implies the existence of a conspiracy, while in the case of political homicide, especially institutionalized political homicide, this does not have to be the case. Political homicide and assassination also differ in the manner, or means, of execution. Assassination is most often carried out with firearms and explosive materials, and less often with cold weapons, while for political homicide there are no restrictions at all in the choice of means, e.g. poison can be used. As concepts, political homicide and assassination therefore intersect, but do not coincide.” (Simeunović 1989: 109-110)

WHAT IS TERRORISM?

For our thesis, it is important to note that the phenomenon of terrorism is equally related to both legal science (Bodrožić, 2017) and political science. Terrorism is certainly a criminal activity, but it is also a political activity par excellence. The functional concept of terrorism implies the existence of a political goal and political motivation among actors. In this sense, there is no “non-political” terrorism. Terrorism is one of the tools of politics. (Simeunović, 2009a: 66 – 67)

“As a social phenomenon, terrorism is a multidimensional phenomenon in terms of its meaning, significance, and structure. The determinant of the multidimensionality of terrorism are its actors. With their activities, they change or maintain its meaning, give or take away its significance, add a new dimension to it or take away an old dimension.” (Simeunović, 2009a: 67) It is also important to emphasize that terrorism is not the same as guerrilla warfare. (Jovanović, Milašinović, 2025)

Acts of violence that are considered terrorist are such in a special context that implies a process and duration. Acts of violence are not a simple sum of basic forms of violence, but in the context of that process they have a different nature that indicates a complex form of violence that is unique and that we call terrorism. In addition, terrorist violence must also have the ability to shock the wider public, while always being illegal. (Simeunović, 2009a: 67)

For our hypothetical framework, it is very important to emphasize that “the goals of terrorism are attempted to be achieved in a systematic manner, which implies organization and continuity of action. Terrorism is therefore both a system of actions and a social process. If there is no permanence and continuation of action, a violent political action, regardless of the severity of its consequences, remains only an assassination or some other form of political violence, but then it is not terrorism.” (Simeunović, 2009a: 68)

Since one of the main goals of terrorism is intimidation, it cannot survive without the existence of a constant threat of new violence. This further implies the already mentioned continuity of terrorist activity. (Simeunović, 2009a: 69)

This means that “it is necessary to distinguish between a terrorist act and a terrorist activity. A terrorist act is only a short-term, although in terms of content the most violent and most terrible segment of



the overall terrorist activity. Terrorist activity as a concept includes, in addition to the terrorist act, a number of other actions, starting from planning to preparing for the execution of that act, and ending with the propaganda and mobilization exploitation of its effects.” (Simeunović, 2009a: 70) Therefore, it is important to emphasize that “since terrorism is a process of action to achieve certain goals, which, like any process, consists of a series of diverse activities that include multiple acts, a single terrorist act is never sufficient confirmation of the existence of terrorism. Only a series of terrorist actions carried out or planned represents a system of actions and legitimizes a phenomenon as terrorism.” (Simeunović, 2009a: 70)

For terrorism to perform its function, the threat of violence must be constant, and the acts of violence must be horrific and terrible. Therefore, the communication “means of terrorism is fear, and intimidation is its procedural method”. (Simeunović, 2009a: 70) In other words, terrorism imitates the reign of terror in an attempt to make fear great and constant among the target of violent attacks. And terrorist attacks must, as a rule, have violence, and this violence is distinguished by its brutality in the sense that the threat of a violent attack is immediate at a distance as long as a human arm, which has the terrifying violence of a violent attack. In order to maintain a constant fear of a constantly existing threat such as the violence of a reign of terror, terrorist attacks must have the characteristic of randomness, and therefore civilian targets are the easiest and at the same time convenient for leaving the impression that a new attack can happen anytime and anywhere, and that the victim can be anyone. (Simeunović, 2009a: 70 - 72)

In order to achieve its goals, terrorism uses various basic and complex forms of violence as a tool, such as the threat of force, and certainly individual and mass political homicide. The victims are most often civilians and employees of the political system, and the main opponent of terrorism is actually the institutions of a state. (Simeunović, 2009a: 80)

For our hypothetical framework, we underline the importance of the regularity that terrorist violence does not exhaust its function only by causing and maintaining great fear in the population. In addition, terrorist violence also has the function of pleasing political like-minded people, encouraging them to engage in political activity, and demonstrating the state’s powerlessness through humiliating attacks, thereby encouraging broader political support. This means that terrorism also has a mobilization function by maintaining the extreme beliefs of the followers of the idea they are fighting for. (Simeunović, 2009a: 70 - 73) In this case, that idea is Islamist extremism, which in its ideologically profiled form is called jihadism. (Simeunović, 2009b: 70 - 73)

ORGANIZATIONAL TERRORISM OR “LONE WOLF” TERRORISM?

In order to be able to study the phenomenon of terrorism methodologically correctly, an appropriate scientific classification is necessary. Simeunović instructs us that it is important to include the principle of predominance and sufficiency as a principle for classifying phenomena such as terrorism because in the field of real events, ideal-type divisions have less scientific basis. In this sense, there are several most important criteria according to which appropriate classifications are made. The criterion of the political goal and program of the terrorists, then the criterion of the means and methods used by the terrorists and the no less important criterion of the subject of terrorist activity. (Simeunović, 2009a: 82)

When it comes to means, we distinguish “conventional, biochemical and nuclear terrorism, and according to methods, conventional, suicide, cyber and narco-terrorism.” (Simeunović, 2009a: 84) When it comes to classification according to the criterion of actors, we notice that we have several types of actors. Actors are certainly victims of terrorism, then the perpetrators themselves, and finally those who are the main targets of terrorists – those to whom fear is communicated through violence. As we



mentioned earlier, in addition to the direct victims of terrorist violence, there are also all those who want to be intimidated by it. (Simeunović, 2009a: 85)

When we talk about perpetrator actors, we also have several types that we distinguish according to the criterion of hierarchical rank. These can be: “leaders of the action core, activists, followers and sympathizers.” (Simeunović, 2009a: 85) This classification is particularly important for our hypothetical framework, bearing in mind the main lines of dispute about the terrorist nature of the attack on the Christmas markets.

Further, according to the actors as subjects of terrorism, we can classify it as: “1) individual terrorism, 2) terrorism of organizations and groups, 3) institutional terrorism.” (Simeunović, 2009a: 85)

It is important to note here that “lone wolf terrorism” belongs to the meaning of “individual terrorism” in this latter classification. We believe that this qualification is more appropriate, especially if we bear in mind that in contemporary studies of terrorism, the use of the term “lone wolf terrorism” is increasingly discouraged because it contributes to the glorification of terrorists, one of whose goals is certainly to achieve exactly that effect among possible ideological supporters.

JIHADISM AND THE DOCTRINAL BASIS OF TERRORIST ATTACKS ON CHRISTMAS MARKETS

Although it was thought that terrorist activity in the European Union would be decreasing, and that the decreasing number of suicide terrorist attacks would be a sign of a significant decline in terrorism, it turned out that conventional terrorist attacks by Islamists continued to maintain a significant presence on European territory. In the wake of suicide attacks, conventional attacks re-emerged, which began to take precedence on EU soil in the second half of the previous decade. For researchers of terrorism studies, the striking terrorist practice of attacks on Christmas markets during the Christmas holidays in various European cities stood out. Attacks on Christmas markets were mainly carried out using conventional means and methods, and firearms and bladed weapons are certainly noteworthy as means due to their frequency. In addition to these common means, terrorist practice of attacks on Christmas markets shows an increasingly used means in the form of a motor vehicle. This will be shown by the analysis of selected cases of attacks on Christmas markets with an emphasis on those attacks in which the means of attack was a motor vehicle.

It is important to note here what is the ideological and doctrinal basis for such terrorist actions. Jihadism is an ideologized Islamic fundamentalism that we could place on the ideological spectrum in the far right. (Jovanović, Radonjić, 2021) Jihadism as an ideology has its own ideological subspecies, such as Al-Qaedaism. Al-Qaedaism is a particularly extreme form of jihadism that emerged as a global ideology on September 11, 2001, with the terrorist organization “Al-Qaeda” and its leader Osama Bin Laden. (Simeunović, 2009a: 209) “The formula of al-Qaida is simple – fighting by all means until the final extermination of all enemies of Islam, which includes Jews, Christians (“crusaders”) and bad Muslims – traitors.” (Simeunović, 2009a: 209) What makes al-Qaida’s contribution known is its focus on the suicidal method of committing terrorist acts. (Simeunović, 2009a)

Since the middle of the last decade, the dominant form of jihadist ideology has been that in the practice of the so-called “Islamic State” (ISIS hereinafter). The doctrinal basis of IS is actually al-Qaida. Instead of focusing on the suicidal method of fighting, the focus is on diversifying the means and methods of terrorist fighting in order to inflict maximum losses anywhere and anytime. In addition, ISIS has the form of a transnational network that does not rely on a strictly centralized organizational structure, and the reach of terrorist attacks is expanding not only by recommending that means

and methods should be various, but also by suggesting that any Islamist can become an ISIS soldier. (Simeunović, 2019)

This doctrine implies a practice in terrorism studies known as “Homegrown terrorism”. Homegrown terrorism implies that the actors are citizens of the state in which they carry out terrorist activity against their fellow citizens. This type of terrorism by homegrown actors can include lone wolves, i.e. individual actors, smaller groups that are self-organized and who have independently trained and practiced their terrorist actions, to actual members of terrorist organizations and previously planted sleeper terrorists who would be activated at some point. (Simeunović, 2011) If we add to this the almost decade-long increase in both Islamist and nationalist extremism in the EU as a consequence of mass migration to Europe, then we can actually complete this entire theoretical picture with the demographic context, which is an increasingly important political issue for the EU. (Simeunović, 2015) And that Islamist terrorists manage to cause great and constant fear in German cities is also shown by the news that many German cities have begun to introduce physical blockades and roadblocks around Christmas markets to such an extent that the prices of special mechanical barriers have jumped several times in the last few years. (Rujevic, 2025)

SELECTED CASES OF CHRISTMAS MARKET ATTACKS IN FRANCE AND GERMANY

Dijon, France December 21st 2014.

Nasser B., driving a Renault Clio, injured 13 people, two of them seriously, (Mazzetti, 2016) while driving into groups of pedestrians in five city zones over a period of half an hour in the city of Dijon, France. During the attack, he shouted “Allahu Akbar”, carried a knife and claimed to be acting on behalf of the children of Palestine. (Corner, 2017) Police determined that the attacker had a documented history of severe mental illness and that there was no evidence of any connection to terrorist groups. Therefore, the investigation ruled out that the attack was motivated by terrorism. (Driver targets, 2014) However, the media claimed that the attack was inspired by a video made by the Islamic State that had been circulating among Muslims in France encouraging attacks on non-believers (Christians) using vehicles. The same claim was repeated for the attack that took place in Nantes a day later. (Martin, 2016) It must be noted that this attack, together with the attack in Nantes, was declared the first attacks in France linked to the Islamic State. (Jones, 2016)

Nantes, France December 22nd 2014

Sébastien Saron, a farmer by profession, hit ten pedestrians with his white van during a Christmas market in Nantes, France, after which he unsuccessfully attempted to kill himself with a knife. Although the injuries were not thought to be life-threatening, one of the victims sadly died the following day. (Le chauffard, 2016) The attacker hanged himself in prison in April 2016 while awaiting trial. (Le chauffard, 2016) As in the previous attack in Dijon, the French police assessed the attacker as mentally unstable. (France to deploy, 2014) A later investigation found that the attacker believed that the French secret service would eliminate him and that he had a blood alcohol level four times the legal limit during the attack. (Drame de Nantes, 2015)



Berlin, Germany December 19th 2016

Anis Amri from Tunisia drove a hijacked truck belonging to a Polish transport company through a crowded Christmas market in central Berlin for a full 50 meters, killing 13 (the last victim died of his injuries after five years), and injuring 56 participants. (Berlin attack, 2021) One of the victims was the murdered truck driver, Polish Lukasz Urban, who was killed by Amri during the hijacking of the truck. (Automatic brakes, 2016) Immediately after the crime, a suspected migrant from Pakistan, Naveed Baloch, was arrested and later released due to lack of evidence of involvement in the crime. (Man wrongly arrested, 2016) After the attack, Amri fled the scene of the crime and was killed four days later in a shootout with police near Milan, Italy, where he had arrived by train from France. (Hundreds attend funeral, 2016) The Islamic State claimed responsibility for the attack, and it released a video of the attacker pledging allegiance to the Islamic State leader Abu Bakr. (Prince, 2016) Amri's family has said that Anis was vicious and not originally overly religious, but that he had become radicalized during his two-year stint in an Italian prison for robbery. (Argouby, Nasr & Scherer, 2016) Due to the large number of victims, this attack is considered the worst Islamist terrorist attack in German history. (Islamistisch motivierter, 2019)

Potsdam, Germany December 1st 2017

German police found an explosive device filled with nails in a suspicious package near the Potsdam Christmas market in a pharmacy in southwest Berlin. Police have not determined who sent the device, to whom it was sent, or whether it was prepared to explode or was just some kind of test. Shortly afterwards, police caused a controlled explosion of the device, which had explosives, batteries and wires, but no detonator. (Potsdam Christmas, 2017)

Strasbourg, France December 11th 2018

Chérif Chekat, a suspected Islamic extremist, opened fire with a revolver at a Christmas market in Strasbourg, France, killing five and wounding eleven people, four of them critically, before fleeing in a taxi. (Strasbourg shooting, 2018) Witnesses claim the gunman shouted Allahu Akbar during his killing spree. (Chrisafis, 2018) Chérif Chekat was killed in a shootout with police two days later. (Strasbourg Christmas market, 2018) Chérif was of Algerian origin and an Islamic fundamentalist. (Décugis, Pelletier & Pham-Lê, 2018) Police later said he had pledged allegiance to the Islamic State, as a video of the oath was found among his belongings during a search of his belongings after he was killed. (Strasbourg gunman Chekatt, 2018) Interestingly, shortly before this revelation, the Islamic State itself claimed responsibility for the attack, but French Interior Minister Castanet denied this and called it an opportunistic claim of credit. (Chrisafis, 2018a)

Trier, Germany December 1st 2020

Five people, including a nine-week-old baby, were killed, while a sixth died of his injuries a year later, (Sixth victim dies, 2021) and a total of 23 were injured when a car drove into a pedestrian zone in the western German city of Trier at full speed. (Amok-Fahrt, 2020) The suspect was immediately arrested and, after a trial, sentenced to life imprisonment and placed in a psychiatric facility after being diagnosed with paranoid schizophrenia. (Erneuter Prozess, 2024) The killer was a homeless German who lived in his car. The police found no evidence that he was motivated by political or religious reasons, but believed that he had mental problems that were exacerbated by alcoholism. The perpetrator stated that his desire was to kill and injure as many people as possible. (Five die as, 2020)



Magdeburg, Germany December 20th 2024

Taleb Al-Abdulmohsen, a 50-year-old doctor, psychologist and psychiatrist, originally from Saudi Arabia, later assessed as an alleged Islamophobe, attacked visitors to the Christmas market in Magdeburg, Germany with a car. Taleb moved to Germany in 2006, and was granted permanent residence in 2016, as a political asylum seeker. (Suspect arrested, 2024) The car was moving at a speed of 48 kilometers per hour and ran over visitors to the fair for a length of 400 meters. (Anklage gegen, 2025) Six people died in the attack, five on the spot – 4 women and 1 child, while the sixth victim died in hospital from his injuries, while according to final information, a total of 338 people were injured (29 without physical injuries). (Suspect admits, 2025) The attacker's motive remained unclear, (Germany Christmas market, 2024) and German officials did not characterize the attack as a case of terrorism. (Generalbundesanwalt lehnt, 2025) The authorities of Dr. Taleb's home country have repeatedly warned Germany that he is a threat to the safety of Saudi diplomats, but the German authorities have dismissed this as an attempt to defame a political asylum seeker. (Benoit & Pancevski, 2024) The German court began the trial of Dr. Taleb on November 10, 2025, when he admitted in his first statement that he was driving a car and that he acted without an accomplice, and that the motive for the attack was not the fact that Christians had gathered at the Christmas market. In his statement, he criticized Islam, Saudi Arabia's policy towards women, and the German government for its openness towards migrants. (Monecke, 2025)

Dingolfing, Germany December 13th 2025

Five men were arrested in a police pre-emptive operation. The arrests were made after it was established that there was a plot to carry out an Islamist-motivated attack. According to the plan of the Islamist extremists, the target of the attack was to be the Christmas market in this Bavarian city. The plan was to carry out the attack with a motor vehicle. Those arrested were: an Egyptian aged 56, a Syrian aged 37 and three Moroccans aged 30, 28 and 22. The Egyptian had previously called for an attack on the Christmas market in a local mosque. (Taha, 2025)

Incident in Giessen, Germany December 22nd 2025

A 32-year-old Azerbaijani man drove his car off the road and hit at least three people standing at a bus stop. At least one person was seriously injured. The Azerbaijani is a permanent resident of the city. Just before hitting the pedestrians, he collided with two other cars. (A car crashes, 2025) The entire incident occurred near the Christmas market in the city. (Nearby Incident, 2025) No further information was available at the time of writing this research.

CONCLUSION

Of the nine selected cases of attacks and attempted attacks on Christmas markets that we have presented in this paper, six were carried out or were planned to be carried out by driving a motor vehicle at high speed and directly killing and injuring several civilians. In four of the nine attacks and attempted attacks, it was explicitly established that the perpetrators were Islamist extremists. In three of the nine cases, it was established that the attacks were committed either in the name of or with the open support of the "Islamic State". For the attack in Magdeburg in 2024, the motive of the mass homicide was political, but it remains unclear for a deeper qualification of the crime. Despite various allegations in



the media that indicate that the perpetrator was an Islamophobe, it remains unclear why an Islamophobe would attack a Christian Christmas market as part of a political mass homicide.

Based on the analysis of selected cases of attacks on Christmas markets, and within the theoretical framework we used, we can determine that a typical attack on Christmas markets has the following characteristics:

- It is predominantly a case of non-institutional, mass political homicide. In these cases, mass homicide does not have the characteristics of a megacide;
- It is always a terrorist act as part of an existing and regular terrorist activity, by different perpetrators of the same political principles of Islamist extremism;
- It is always a terrorist act within the ideological framework of jihadism, and more narrowly in accordance with the elements of the combat doctrine of the "Islamic State";
- It is predominantly terrorism by an organized group, and less often an act of individual terrorism;
- It is a terrorist act in which a motor vehicle is primarily used as a means of attack;
- It is a terrorist act in which the method of execution is primarily the driving of a motor vehicle at high speed into civilians;
- This is a terrorist act in which all victims are presumably exclusively Christians.
- The lessons that can be drawn from this research indicate that the measures of national security authorities must be adjusted to the following conclusions:
 - Stopping specific terrorist acts will not stop terrorist activity;
 - Neutralizing individual terrorists cannot prevent the emergence of a new terrorist group;
 - If the liquidation of an entire terrorist organization or group is achieved, this does not mean that the network of Islamist extremists who radicalize Muslims in common gathering places will disappear.

We would like to emphasize that the specificity of choosing a permanent target, which may even indicate a specific period of the attack, contradicts the rule that terrorist attacks should adhere to random strikes in both spatial and temporal terms. This may indicate attempts by terrorist groups to elevate religiously-based political struggle to a new level of conflict.

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THE IMPORTANCE OF WOMEN'S PARTICIPATION IN DECISION-MAKING AS A RESPONSE TO CLIMATE CHANGE

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ABSTRACT

Purpose: The goal of this work is to analyze and show the importance of the role of women in decision-making regarding climate change. Women are recognized both nationally and globally as important bearers of important roles and changes when it comes to sustainable energy sources, climate change and other issues related to sustainable development.

Design/Methods/Approach: We have singled out recent research that clearly proves that the role of women is really very important when deciding on measures to mitigate climate change... It should be pointed out that in poor areas, women are still exclusively assigned housewives as primary jobs.

Findings: Although there are still men's and women's jobs, it is important to point out that this division is slowly being neutralized. Available data indicate that more and more women are involved in the decision-making and management process when dealing with issues of sustainable energy, climate change and the environment.

Originality/Value: There are clear observations that the role of women in decision-making is a little more favorable than it was in the past two decades. Women still encounter obstacles in their advancement, but research shows that a number of initiatives and projects are being implemented that strengthen the role and position of women in society.

Keywords: gender equality, climate change, security, sustainable development.

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INTRODUCTION

Climate change is undoubtedly a provocative topic both in the world and in our country. The dangers and risks that climate change brings with it have become an integral part of everyday life. The disruption of balanced conditions in the environment as well as the unity of natural and social components is expressed in the threat to the stable functioning of both the biosphere and society, calling into question the existence of man as a natural and social being. (Blagojević et al., 2011: 544)

Although climate change affects everyone, women and men, due to their different positions in society, may experience the consequences of climate change differently, with women often being more severely affected by the consequences of these changes. Climate change negatively affects the lives of men and women, and generally speaking, it has a greater impact on poor women, due to their limited access to resources, recovery, rehabilitation, etc. (Dimitrov, 2019)

Human health and safety are at risk due to the negative effects caused by climate change, such as the lack of access to food, water, healthcare, and energy. Climate change and its consequences affect everyone, regardless of gender, race, religion, or ethnicity, but we can still conclude that there are some differences in the impact on social communities and individuals. (Arora-Jonsson, 2011:748)

In the future, it is to be expected, bearing in mind the enormous pollution and climate change, that the threshold of tolerance for pollution and the damage it causes to the environment, and therefore to people, as an integral part of the same environment, as well as to their property, will be getting lower and lower. (Galić, 2025:133)

One of the most important ways to protect the environment from all negative impacts that disrupt its quality and sustainable development itself is timely and complete information about its condition, which is a civil right protected by the constitution, but at the same time an obligation of competent authorities and institutions to make information of environmental importance available to the entire public. (Galić 2025:164)

Recent literature has focused on exploring why women are more vulnerable to the impacts of climate change and why there are gender differences in mitigation behaviors and attitudes. As Arora Johnson (Arora-Jonsson, 2011:747) points out, women's decision-making ability as a virtue has increased their responsibility but without increasing their power.

Environmental disasters represent serious situations that are large in scale and dangerous for the entire living world, humans, plants and animals. Unfortunately, disasters are most often the result of the action of the human factor. Environmental disasters are accompanied by incalculable economic losses, but also a large number of human victims, as well as far-reaching consequences for the health



of the population. Even the healthiest economies are not ready to deal with all the challenges that such crises bring with them.

Society should understand its place in the natural space and its very important role in maintaining the natural balance. Ecological culture as a part of general culture is based on environmental education and improvement by developing ecological awareness. Preserving and maintaining the unity and maximum productivity of nature and society promotes the preservation and sustainable use of the biosphere as a whole.

THE IMPORTANCE OF GENDER EQUALITY IN THE FIGHT AGAINST CLIMATE CHANGE

Equal access to decision-making is a significant step towards achieving gender equality. Climate change affects all population groups and each individual, whose vulnerability depends on a number of factors. Among the extremely negative direct consequences is certainly the increase in temperatures, the changes of which affect the health and life of people, but also agricultural and energy production, the occurrence of forest fires, etc. On the other hand, extreme precipitation, which results in the occurrence of floods, landslides and rockfalls, directly threaten human lives and property, as well as the security of supply and availability of food, water, and energy.

The impacts of climate change affect women and men differently. Vulnerability is not only related to environmental factors, but social conditions also play a major role. Due to their low adaptive capacity, the poor are the most vulnerable group. Given that women make up a disproportionately large percentage of the world's poor, they are among the most vulnerable groups. Women and men have different relationships with the environment and its resources. It is common to hear that women are more often than men responsible for household chores, as well as caring for children and family members. Such gender relations affect social roles and power structures and are present in every society. This is precisely what leads to gender differences, which are reflected in inequality and the uneven distribution of resources necessary for everyday life. (Scholastica, Olanrewaju, 2022:54)

The poor and marginalized segments of many societies (women, the elderly, immigrants, indigenous groups, etc.) are vulnerable groups. Climate change affects men and women differently largely because of their gendered distribution of power, roles and responsibilities at the household and community levels. Women tend to be overburdened with household chores and childcare. For example, during the 2004 Asian tsunami (70% of victims were women), many women and children were trapped in their homes, while most men were engaged in work outside the household. Differences in economic opportunities and access to productive resources also make women more vulnerable to climate change because they are often poorer, less educated and not included in political, community and household decision-making processes that affect their lives. (УНДП, 2016)

In many studies, women's greater vulnerability to climate change is attributed to their lack of resources. Studies have provided evidence that people with fewer available resources are generally more affected by climate change. People with lower incomes tend to work in agriculture, which is the sector most affected by climate change. People in low-income households are also more vulnerable to external factors because they work in unstable jobs with high levels of income insecurity. Women, compared to men, often have limited access to resources, less access to justice, limited mobility, and a limited voice in decision-making and policy-making. (Schwerhoff, Konte, 2020)

The most famous study (Neumayer, Plümper, 2007) on gender and disasters found, based on data from 141 countries, that more women than men die in disasters, predominantly younger women, especially



in poor communities, due to gender-based discrimination to which they are exposed. This means that the vulnerability of women in emergency situations is higher, while the capacities (information channels, physical strength and skills, tools and equipment, etc.) are lower. Additionally, women's vulnerability is gendered, which means that it is caused by gender norms and roles. These inequalities are based on the position of men and women at the structural level, but are also visible at the individual level in emergency situations.

Theoretical assumptions and observations that poverty and low social and economic status are important causes of crime have been verified in a large number of empirical studies conducted in European countries and America during the last three decades. (Radović-Stojanović, Tomić, 2019:51).

Achieving gender equality is one of the Global Goals of Sustainable Development, and it is also defined in European Union and United Nations documents, some of which (such as the United Nations Convention on the Elimination of All Forms of Discrimination against Women - CEDAW²) are legally binding for signatory countries.

The technical document of the United Nations Framework Convention on Climate Change (UNFCCC) from 2016 defines the introduction of a gender perspective (gender mainstreaming) as a process of assessing the impact on women and men of any planned action, including laws, policies or programs, in all areas and at all levels. It is a strategy for including the priorities and experiences of both women and men in the implementation, monitoring and evaluation of policies and programs in all political, economic and social spheres, so that both women and men benefit equally from them and do not treat them unequally. The ultimate goal is to achieve gender equality.

Interest in introducing a gender perspective began to develop within the United Nations, together with the formation of the UN Commission on the Status of Women (CSW)¹ in 1947. The turning point, however, came only in 1980, when the Second World Conference on Women was held in Copenhagen. On that occasion, it was pointed out that women did not benefit from previous development programs and that there was a need to look at development problems from the perspective of women in order to achieve greater equality between women and men. Five years later, at the Third World Conference on Women in Nairobi (1985), the topics of peace and conflict were included for the first time in discussions about women. At the conference, the connection between sustainable development, economic empowerment of women and the application of the principles of gender equality and equal opportunities was established, which was also incorporated into the strategic document in which the causal relationship between women and the protection and preservation of the environment was clearly highlighted. (UNITED NATIONS, 1986)

Another important date and event is the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992, where the position was unequivocally agreed that women pay the highest price for damaging the environment, but also that they have the greatest potential for finding solutions to crises and problems of sustainable development.

At the fourth United Nations World Conference on Women, held in Beijing in 1995, the text of the Declaration defines the environment as one of the twelve critical areas for women. In the Beijing Platform for Action, in the section on women and the environment, it is stated that the role of women is crucial in the processes of sustainable development and environmental protection.

The Paris Agreement on climate, adopted in 2015, represents an important moment in the history of the inclusion of gender issues in the field of decision-making. The Paris Agreement, as a major step for international engagement in the field of climate change, integrated gender equality. There is no doubt that climate change is a common concern of all humanity, so parties should, when taking measures to address climate change, respect, promote and consider their obligations related to human rights,



the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and persons in vulnerable situations and the right to development, as well as gender equality, women's empowerment and intergenerational equality.

CLIMATE CHANGES AND GENDER EQUALITY IN THE REPUBLIC OF SERBIA

During the last decades, the Republic of Serbia has faced new risks to human health which are directly or indirectly related to climate changes. (Mićović, 2017:103). The Constitution of the Republic of Serbia guarantees equality between women and men, prohibits discrimination on the basis of gender and other personal characteristics, and stipulates the obligation of the state to pursue a policy of equal opportunities. The legal basis for regulating equal rights and achieving gender equality in Serbia is found in the Law on Gender Equality, which was adopted in 2021 and is aligned with the EU acquis. It is also worth mentioning the Law on the Prohibition of Discrimination, which represents the legal basis for sanctioning and eliminating all forms of discrimination, including discrimination on the basis of gender and gender identity. A number of special laws regulate the conditions for achieving gender equality in specific areas (labor and employment, social and health protection, protection against violence, access to property, etc.).

Improving the capacity of women's civil society organizations and promoting gender equality and banning discrimination in the process of reducing the risk of disasters in the work of responsible entities has become an urgent issue in the Republic of Serbia. The recognition of the component of gender sensitivity and its definition by normative-legal regulation in the activities of protection and rescue entities in the Republic of Serbia is a significant fact, but it is still necessary to emphasize that it is to be more visible in the future. In the Report on floods from 2014, there is information that in some of the threatened local governments, the component of the gender perspective was not visible and that the persons in charge of these issues were inactive.² (Radović, 2015:26)

The Republic of Serbia is a signatory to several important and binding international documents that guarantee equality between women and men and prohibit discrimination on the basis of gender. Among these documents, the most important are those of the United Nations (Universal Declaration of Human Rights, Convention on the Elimination of All Forms of Discrimination against Women — CEDAW), the Council of Europe (European Convention for the Protection of Human Rights and Fundamental Freedoms, European Social Charter and Council of Europe Convention on preventing and combating violence against women and domestic violence) and the European Union (Charter of Fundamental Rights of the European Union), etc.

It should also be noted that a solid legal framework has been established in Serbia today in the field of environmental protection and climate change, which is still being harmonized with the legal acquis of the European Union. In addition to this, Serbia has ratified all relevant international agreements in the field of climate change, such as the Kyoto Protocol, UNFCCC, the Paris Agreement, etc. In 2015, in accordance with the Paris Agreement, Serbia prepared and adopted a Nationally determined contribution to the reduction of greenhouse gas emissions (GHG).

Analyses of the practice of local self-governments in the management of emergency situations that followed the floods in 2014 showed that the population, especially women, were not sufficiently included

² Radović V., ANALIZA RODNE PERSPEKTIVE U PROCESU SMANJENJA RIZIKA U IZABRANIM LOKALNIM SAMOUPRAVAMA, RODNA RAVNOPRAVNOST I SMANJENJE RIZIKA OD KATASTROFA, Pokrajinski zaštitnik građana – ombudsman, Novi Sad, 2015:26



in the prevention and management of emergency situations, especially not in a formal and systematic way, as well as that emergency situations are not considered sufficiently from the point of view of the local community, as much as from the national level, through the procedures established in the Department for Emergency Situations within the Ministry of Internal Affairs. This is of course justified considering the procedures, competences of various authorities and the complexity of emergency management, as well as the role of security services (MIA - emergency sector, firefighters, rescue units), but the advantages of an approach that would recognize local circumstances, specific risks, resources and the vulnerability of the population to a greater extent have also been noted. (Baćanović, 2014)

Within the framework of the document "Serbia and Agenda 2030", which refers to climate change, it can be concluded that Serbia has prepared legal regulations, but implementation is in the initial phase. The key documents submitted by Serbia in relation to the implementation of this goal are: "Programme for Adaptation to Changing Climate Conditions for the Period from 2023 to 2030", "Strategy for Low-Carbon Development of the Republic of Serbia for the Period from 2023 to 2030 with Projections to 2050", "Programme for Air Protection in the Republic of Serbia for the Period from 2022 to 2030 with Action Plan" (Седлак М., ет ал, 2025:303).

During 2021, the Strategy for Gender Equality for the period from 2021 to 2030 was adopted. As stated, the vision of the strategy is a gender-equal Serbia, in which women and men, girls and boys, as well as persons of different gender identities, are equal, have equal rights and equal opportunities for personal development, provide an equal contribution to the sustainable development of society, enjoy equal benefits from the development of society, participate equally in decision-making about the development of society and assume equal responsibility for the future (Beker, Janjić, 2023)

According to research by the Center for the Promotion of Sustainable Development (CPOR), women in Serbia are very interested in energy efficiency and renewable energy sources (as many as 72 percent of the respondents), while half of the women pointed out that their household has already invested in improving energy efficiency, citing money saving and environmental protection as the reason. The research also showed that it is extremely important for women in Serbia that their work is in accordance with the principles of sustainable development and that they support the state in adopting policies in the field of energy and climate change, which promote sustainable energy development based on the application of green technologies.

In July 2007, the maximum daily temperatures in almost the entire territory of the country exceeded 35°C for nine consecutive days between July 16 and 24. In Smederevska Palanka and Podunavski District on July 24, the highest temperature in Serbia was recorded at 44.9°C. During this heat wave in Serbia, there were a total of 167 excessive deaths; in 151 cases (90%) these involved people older than 75 years. The increase in mortality among the elderly was 76% compared to the initial mortality. Excess female mortality was more than twice as high as male excess mortality. The greatest increase in mortality was from diabetes mellitus, chronic kidney disease, respiratory system disease and nervous system disease. Mortality from cardiovascular and malignant neoplasms represents the largest absolute number of excess deaths. (Bogdanović et al., 2013: 141)

The United Nations Agency for Gender Equality and Women's Empowerment - UN Women Serbia, in cooperation with UNDP, through projects financed by the Global Environment Facility (GEF), supports the initiatives and activities of the Ministry of Environmental Protection in the field of including a gender perspective in the fight against climate change. UN Women organized a series of local educational events throughout Serbia, with the aim of supporting the development of gender-sensitive criteria within the call for project proposals in the areas of open data and innovative solutions. These calls are part of the project "Local development resistant to climate change", which was jointly announced



by the United Nations Development Program (UNDP) and the Ministry of Environmental Protection of the Republic of Serbia.³

Improving the capacities of women's civil society organizations and promoting gender equality and the prohibition of discrimination in the process of disaster risk reduction in the work of responsible entities has become an urgent issue in the Republic of Serbia. Recognizing the gender sensitivity component and defining it through normative and legal regulations in the activities of protection and rescue entities in the Republic of Serbia is an important fact, but it is still important to emphasize that it is necessary to make it more visible in the future. The 2014 Flood Report contains information that in some of the affected local governments the gender perspective component was not visible and that the persons responsible for these issues were inactive. Although women are disproportionately affected by disasters and rapid changes in the environment, they have contributed to reducing the impact of climate change.

Women's knowledge and responsibilities in managing natural resources have proven crucial to community survival. As evidenced by the aftermath of Hurricane Mitch in 1998, La Masica, Honduras, surprisingly reported no deaths. The disaster agency had provided community education on early warning systems and hazard management six months in advance, with gender-sensitive interventions. Women took over the task of continuously monitoring the early warning system that had been abandoned by men. As a result, the municipality was able to evacuate the area quickly when Hurricane Mitch hit. (Agilera, 2004)

It is very important to mention the project implemented by the Civil Society Organization Center for the Promotion of Sustainable Development in partnership with the Swiss Cooperation Office (SECO). The project was supported by the Ministry of Environmental Protection of the Republic of Serbia, the Ministry of Mining and Energy of the Republic of Serbia, the UN Economic Commission for Europe (UNECE) and the Energy Community. The target group included women professionally involved in sustainable energy, climate change and environmental protection and women energy users (consumers).

Eight hundred women participated in this research, and the data of the Republic Office of Statistics from the 2011 population census were used as a source for creating the research sample. The sample was set according to the size of the target group, namely women between the ages of 25 and 55 within each of the four statistical regions and both types of settlements. The research was conducted in January 2018. (WISE SEE, 2018)

Women employed in international organizations are very actively involved in projects in the field of sustainable energy, climate change and environmental protection. The projects were managed by 75% of the respondents, and 70% of the projects they mentioned also contain a gender equality component, which is increasingly a standard request of donors. The introduction of a gender perspective in projects is promoted by the OSCE Mission in Serbia, UNDP projects in the field of climate change and environmental protection with the support of UN Women and cooperation with the Women's Architectural Society, the Swedish Development Agency SIDA, and especially two regional projects GIZ Open Regional Fund for Southeastern Europe - Energy Efficiency and Open Regional Fund for Southeastern Europe - Biodiversity. (WISE SEE, 2018)

The general impression is that women in Serbia are very interested in energy efficiency and renewable energy sources - as many as 72% know or would like to know more about measures to improve energy efficiency, and among those who want to be educated, the youngest respondents (ages 25 to 34) are the most numerous. The fact that only 3% are not interested in this topic is particularly encouraging. Half of the surveyed women point out that their household has already invested in improving energy effi-

³ <https://inovacije.klimatskepromene.rs/>



ciency. A large number of those who have not yet done so (42%) state that the reason is of a financial nature, and only 7% do not even think about it.

Research conducted on a nationally representative sample of women in Serbia (women professionally engaged in sustainable energy, climate change and environmental protection and women in the household) showed that women support the state in adopting policies in the field of energy and climate change, which promote sustainable energy development based on the application of green technologies, smart and advanced solutions. Also, it is very important for women that their work is in accordance with the principles of sustainable development. (WISE SEE, 2018)

CONCLUSION

Environmental security threats arise as a result of ignorance or poor management of natural resources, as a result of intentionally caused damage or as a result of a combination of natural and human factors. Climate change is a human rights crisis because it threatens our right to a healthy life.

With their skills, knowledge, creativity and innovation, women show a strong potential in the fight against climate change. Although there is a noticeable positive trend in the representation of women in sustainable energy, climate change and environmental protection in Serbia, their number in public institutions and companies continues to decrease as one moves towards the top of the hierarchical ladder. They are aware that they are not completely equal to men, but they rarely recognize gender inequality. Women still believe that career progress and women's position depend to the greatest extent on themselves, on their efforts and commitment, despite the fact that they face problems and obstacles because of being women.

Additional barriers include gender discrimination, harassment, male-dominated hiring and promotion boards, and working conditions that are not adapted to family and parental responsibilities.

Women in households in Serbia show a high level of information about energy efficiency. Lack of money is the most common reason for not implementing improvement measures. Women in households are not at all familiar with the activities of their local self-governments when it comes to incentive measures in the area of improving energy efficiency and activities related to climate change, although they show great interest in being informed about these topics. Gender aspects of international or domestic civil society organizations are increasingly becoming binding in projects on climate change and environmental protection, and most often represent a requirement, given that gender equality is globally recognized as a prerequisite for sustainable development. Women in the general population show an orientation towards sustainable solutions. They support the state in adopting policies that promote sustainable energy development. They are also positive about buying an electric vehicle if a subsidy is provided.

The recommendation is to improve the representation of women at the decision-making level in public institutions and public enterprises in the sectors of climate change and environmental protection. Women also have the primary responsibility for the care of children, the elderly and the infirm, as well as housework. That is why they are the first responders in disasters, but also after them, caring for those who are injured, helping the community, providing support and help when needed.



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SOCIAL MEDIA AS A CATALYST FOR RADICALIZATION: ETIOLOGY AND MODERN TRENDS

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ABSTRACT

Purpose: The purpose of this paper is to examine how social media platforms contribute to radicalization by exploring the mechanisms, factors, and trends that facilitate the spread of extremist content and influence contemporary crime. The paper will also analyze previous radicalization cases in North Macedonia, specifically assessing whether and how many individuals were radicalized online, and investigate if those convicted for foreign terrorist fighter (FTF) -related crimes – most of whom have already served their sentences – continue to share their ideology online.

Design/Methods/Approach: The study utilizes recent case studies and empirical research to analyze the role of platforms like Facebook, Telegram, and YouTube in disseminating extremist content. It investigates extremist tactics and psychological vulnerabilities, focusing on digital echo chambers and targeted recruitment. Additionally, the research will include a review of official documents, existing research, and online content to identify patterns of radicalization in North Macedonia, with particular attention to FTF cases and ongoing online activity by former convicts.

Findings: Social media significantly accelerates radicalization through algorithm-driven content amplification and tailored extremist strategies, especially among youth. The study identifies challenges for law enforcement in differentiating between radical expression and actual threats and underscores the impact of digital echo chambers and online propaganda in normalizing extremist views. In North Macedonia, online media are a potent mechanism for radicalization, with unregulated environments enabling the spread of extremist narratives. Preliminary findings suggest that while religious radicalization is perceived as a higher risk, online channels play a significant role in both religious and political radicalization. The analysis of FTF cases will provide insight into the prevalence of online radicalization and the extent to which former FTF convicts remain active in disseminating extremist ideologies.

Originality/Value: This paper provides a comprehensive and contemporary overview of online radicalization's etiology and phenomenology, integrating empirical evidence with case studies. By including a focused analysis of North Macedonian radicalization cases – particularly those involving FTFs and their post-release online activities – it offers valuable, context-specific insights into emerging trends and practical implications for prevention and intervention in the digital age.

Keywords: online radicalization, social media, foreign terrorist fighters.

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INTRODUCTION

The development of communication technologies has had an impact on shaping communication and social interaction around the world. Social media particularly has undergone a significant evolution over the past two decades, from an online networking tool to a multifaceted tool used to connect with others, share information, and even conduct business and political activities. While offering numerous benefits, social media also presents challenges related to privacy and the spread of misinformation.

A particular challenge for security services around the world is the misuse of social networks by radical groups, who use the virtual space to reach a large number of people around the world, thus spreading their radical ideology. Radicalization – the process by which individuals increasingly adopt extremist beliefs that may lead to violence – is increasingly influenced by online interactions, making social media a pivotal factor in modern radicalization trends.

Radicalization is often a hybrid process involving both online and offline influences, although fully online pathways have become more common in recent years, especially during periods of increased online engagement like the COVID-19 pandemic.

This study focuses on social media's role in radicalization with particular emphasis on North Macedonia – a region marked by ethnic diversity and strategic significance in the Balkans. The country has seen notable cases of radicalization, including foreign terrorist fighter mobilization during the Syrian conflict. By examining online radicalization mechanisms, cases of convicted foreign fighters, and their post-release online activities, this paper aims to provide context-specific insights into the evolving landscape of digital extremism.

Through a combination of theoretical frameworks and empirical case studies, the research underscores the intertwined offline and online nature of radicalization and discusses challenges related to prevention, law enforcement, and policy-making. It highlights the necessity of mutual, international approaches to counter radical content and foster resilience against digital extremism.

SOCIAL MEDIA AS A CATALYST FOR RADICALIZATION

Violent online radicalization usually begins through selection, which can be targeted and organized, or it can be spontaneous, i.e., self-selection when someone is selected through his/her behavior (through monitoring contacts, activities on social networks, discussions in various chat rooms, etc.). For the purpose of targeted selection, some of the well-organized malicious groups and individuals have developed profiling methodologies. By scanning online activities and collecting and processing data (analyzing the behavior of the target), these groups or individuals begin a selection process. Self-radicalization can also occur when a random victim reads online literature, forums, and blogs from dubious sources or broadcasts videos, audio recordings, or songs with content that aims to violently radicalize.



Knowing about these opportunities for expanded self-radicalization, terrorist groups are increasingly present in the virtual space. For example, the terrorist organization Al-Qaeda had long published various information on its website in order to spread its ideology and recruit young fighters before the website was removed from the Internet. Today, membership is present in the online space through Al-Sahab – a media wing of Al-Qaeda responsible for producing and disseminating the group's propaganda materials (NEFA Foundation, n.d.). Al-Sahab produces and distributes videos, statements, magazines, and footage featuring Al-Qaeda leaders and operations. In addition to video messages from the leadership, martyrdom videos (suicide bombers and fighters) are also published, as well as training and operational videos and documentaries promoting al-Qaeda's ideology. While its primary output is in Arabic, many of its productions feature English subtitles to reach a global audience. Al-Sahab operates mainly on the social platform Telegram but also on private jihadist forums, the dark webs, and other private platforms.

In one of the recent videos published by the senior leader of al-Qaeda in the Arabian Peninsula (AQAP), the organization issued a direct call to lone-wolf attackers worldwide (Al Jazeera, 2025). The video, approximately 30 minutes long, was released amid Israel's ongoing war on Gaza and framed the conflict as part of a broader "crusade" against Muslims. The leader explicitly states that there are no limits to what targets are acceptable in response to the war in Gaza. It is interesting to note that the rhetoric was emotional, vengeful, and designed to resonate with frustrated individuals sympathetic to the Palestinian cause. This means that Al-Qaeda is strategically crafting its message to emotionally manipulate people, especially those already angered or disillusioned by the war in Gaza. At the same time, the group is exploiting real political and humanitarian crises (like Gaza) to legitimize extremist violence, hoping to turn sympathy into radicalization. In other words, it's weaponizing compassion and outrage for recruitment.

The messaging is tailored for individuals who feel powerless, giving them a sense of personal mission or revenge, even outside formal jihadist structures. This is a classic lone-wolf recruitment method – turning personal frustration into violent action. Rather than deep religious or ideological reasoning, the emphasis is on emotion: anger, vengeance, betrayal – which can mobilize people faster than traditional indoctrination. Thus, this suggests the message is more populist than theological.

One of the deadliest terrorist organization – ISIS – is also very present in the online space. According to Bodine-Baron et al. (2016), "Its social media prowess has quite possibly played a part in ISIS's enormous success in recruitment". Their online propaganda is one of the most aggressive and played a central role in recruitment, radicalization, and inciting lone-wolf attacks, especially during the group's peak from 2014 to 2017. Their propaganda included execution videos, battlefield success, and life in the so-called "Caliphate". In order to reach more people across the world, they are sharing content in many languages, such as Arabic, English, French, and Russian. The U.S. House Committee on Oversight and Government Reform (2015) discusses that ISIS's use of social media is resonating with vulnerable populations, particularly Muslim converts and susceptible alienated youth. As noted by Stern and Berger (2015), the Islamic State has been highly effective at using social media platforms like Twitter, Facebook, and WhatsApp to spread terrorist messaging, recruit, mobilize, and finance their operations globally. Namely, over 43,000 active pro-ISIS Twitter accounts consistently spread ISIS's messages of hatred and terror. The fact that more than 30,000 people globally have joined ISIS highlights the significant influence of social media in fueling this threat (U.S. House of Representatives, Subcommittee on National Security, 2015).

Through these channels, the group released step-by-step terrorism manuals (so-called DIY (do it yourself) guides) that instructed followers on how to make explosives, carry out stabbings, or use everyday vehicles as weapons. This online content was deliberately designed to encourage individuals,



particularly those living in Western countries, to conduct attacks independently, without needing to travel or establish direct contact with ISIS operatives. In one of the online manuals (Safety Guide for Lone Wolves, Mujahideen, and Small Cells), in a visual way, by sharing stories and advice from their “soldiers”, as well as sharing the basic principles of the organization, they tried to encourage and incite disaffected people from all over the world to join them (Ryan, 2015).

According to a report by Vidino, Marone, and Entenmann (2017), one of the most notorious Islamic State virtual recruiters was Rachid Kassim, a former rapper from Roanne, France. After traveling to Syria in 2015 with his family to join ISIS, Kassim began operating an influential Telegram channel called Sabre de Lumière. Through this platform, he actively directed and inspired followers in Europe to carry out attacks, often publishing weekly “target lists” that called for violence against religious leaders, media figures, entertainers, and law enforcement officers. He also appeared in official French-language propaganda videos, further solidifying his role as a key instigator of remote jihadist violence.

Considering that the majority of users of social networks are generations Z and millennials, young people are a particularly vulnerable group to online radicalization. As some studies have shown, social media use is widespread among teenagers, with up to 95% of youth ages 13–17 reporting that they use at least one platform (Office of the Surgeon General, 2023).

Having this in mind, it's important to note that according to the National Consortium for the Study of Terrorism and Responses to Terrorism (START, 2018), the internet played a primary or contributing role in the radicalization of 86% of the foreign fighters.

There is no exact time frame for how long it takes for a person to become radicalized (i.e., the time from first exposure to extremist beliefs to participation in extremist acts). However, several studies have been conducted, mainly in the United States, and according to Conway, Scrivens, and Macnair (2018), in 2016, when over 90% of U.S. foreign fighters were active on social media, the duration of radicalization was 13 months on average. On the other hand, Simonetti (2021) explains that Jensen's research found radicalization times in the U.S. have decreased dramatically (from 18 to 7 months), largely due to increased online activity. Unlike in the 1980s or '90s, when far-right extremists needed real-life connections for recruitment, the process is now much faster.

In addition to social networks, young people are often exposed to radical propaganda in video game chat rooms. On the other side of the chat group are also often young people who are already radicalized. These young people are used by the higher structures of terrorist organizations as propagandists and indoctrinators who can more easily influence their young peers because they share a common language and generational interests.

Particularly dangerous are the so-called religious preachers who are active on social networks as influencers. These self-proclaimed preachers particularly target young people, to whom they present certain theological views. They often have excellent oratory skills but are also religiously educated, so they act convincingly and easily gain trust among young people. They use open groups on social networks only for initial contact with potential followers, while avoiding sharing radical views and calls for violence in open groups, knowing that this is illegal and probably assuming that social networks are monitored by security services. The real radicalization comes later, in smaller groups in chat rooms on Telegram, Signal, or another platform, and sometimes behind closed doors in physical premises, if the people are from the same country.

Given the impact and consequences of online radical propaganda, states are taking measures, first by criminalizing the act but also by taking preventive action through identifying and closing online channels that spread radical propaganda. For instance, in the Netherlands, a man was sentenced to two years in prison by the Court of Appeal in The Hague after being convicted of involvement in a



terrorist organization, inciting terrorism, and terrorist training. He spread violent jihadist and IS-related content through various social media platforms, including managing 30 Telegram channels with pro-IS material, which had up to 1,024 followers at the time of his arrest (Europol, 2024, p. 17).

TARGETED RECRUITMENT AND PROPAGANDA TECHNIQUES

Online radicalization frequently stems from strategic psychological tactics employed by extremist groups. These groups take advantage of people's emotional weaknesses, such as loneliness, the need for connection, and the quest for purpose, to draw them in. Through advanced recruitment methods like personalized targeting and crafting compelling emotional stories, they successfully influence some individuals toward radical beliefs and motivate them to act.

Modern terrorist groups recognize that uniform recruitment tactics are ineffective. They adopt tailored messaging strategies by segmenting their audiences based on criteria such as age, gender, religion, geography, psychological characteristics, and specific grievances. This approach allows them to create customized content that strongly appeals to each distinct group.

For young men, the recruitment material often features dynamic, action-packed scenes that mimic violent video games, appealing to their sense of adventure and desire for excitement. The narratives are designed to frame involvement in the cause as both thrilling and heroic.

Meanwhile, the messaging directed toward women is entirely different. Recruiters often emphasize themes of sisterhood and belonging. They highlight the importance of marriage to fighters and the role of motherhood within the movement, casting these roles as vital contributions. This approach offers women both a sense of community and meaningful purpose.

For Western Muslims who feel alienated or discriminated against, the messaging takes on yet another tone. Here, recruiters focus on the internal struggles of identity and belonging, presenting a "pure" Islamic community as a remedy for feelings of isolation and marginalization. They suggest that joining their group will resolve identity conflicts and provide a supportive environment, making radical engagement feel like both a personal resolution and a just cause.

Regarding the narratives, extremist groups carefully shape their propaganda by using powerful ideological and emotional themes to influence their target audiences. One common approach is framing jihad as a religious obligation, portraying it as a sacred duty that every believer must fulfill. This taps into deep spiritual commitments to motivate followers.

They also emphasize a narrative of victimhood, focusing on the suffering of Muslims in conflicts such as those in Syria (Winter, 2015, p. 23). By highlighting these injustices, they seek to evoke strong feelings of anger and empathy, which can fuel a desire for action. Another important theme centers on heroism and martyrdom. Fighters who die in battle are glorified and depicted as honorable heroes, making sacrifice appear noble and desirable. This portrayal serves both to inspire recruits and to legitimize violence.

Lastly, these groups often promote apocalyptic visions, suggesting that a final, inevitable battle or the restoration of a caliphate is forthcoming. This sense of looming, historic urgency encourages supporters to commit themselves fully, believing they are part of a grand, divine struggle. Through these carefully crafted narratives, extremist organizations manipulate emotional and religious sentiments to deepen commitment and propel individuals toward radicalization.

Terrorist recruiters have become adept at manipulating social media platforms to further their agendas. They strategically use hashtags and keywords to draw in users who are either curious or politi-



cally engaged, making it easier to spread their content to a wide audience. To amplify their reach even further, they deploy networks of fake accounts that boost the visibility of extremist material, creating an illusion of popularity and legitimacy. Moreover, these groups often encourage potential recruits to move beyond public spaces into private and encrypted messaging apps like Telegram, Zero Net, or Rocket.Chat (King, 2019). These secure platforms provide a safer environment for grooming, indoctrination, and instruction away from the scrutiny of authorities.

Once initial contact is made, recruiters typically transition to one-on-one private conversations where they work to establish trust and provide personalized spiritual guidance. In these intimate exchanges, they offer tailored advice and emotional support, fostering a sense of brotherhood and belonging. They may also guide recruits through the practicalities of radical commitment, such as instructions for hijra (migration to conflict zones) or detailed steps for planning attacks. This personalized approach allows recruiters to gradually deepen the individual's involvement and commitment to the extremist cause. For example, Junaid Hussain, a British ISIS fighter, used Surespot (an encrypted messaging program) to recruit and guide attackers, including the Garland, Texas attackers in 2015 (Regional Cooperation Council, 2018).

PATTERNS OF RADICALIZATION IN NORTH MACEDONIA

Since the early 1990s, many foreign Muslim charities, mainly Arab, have found their way into the Balkan region, and thus into Macedonia, taking advantage of the lack of political and economic stability resulting from the collapse of socialism and the period of transition, as well as the reduced capacities of the security services to monitor suspicious activities. Most of these organizations were well-intentioned and did not have radical ideologies. Unfortunately, some more radical organizations managed to hide behind this screen while strengthening their presence in the Balkans and recruiting followers. Their huge financial resources helped them reach mainly the poor communities, which were actually their target group. The lack of sovereignty of certain parts of the country was fertile ground for radical-oriented organizations to spread extremist ideas in the local and religious environment, mainly based on radical ideology.

Although such radical ideas have been spreading throughout the country's population since the late 20th century, the war in Syria was an additional opportunity for recruiters of foreign fighters to successfully mobilize around 150 Macedonian citizens. A small number of them are believed to still be on the battlefields of the Middle East, some have died fighting for the ideals of ISIS, and most have been returned to the country. Of those repatriated, some have already served or are still serving prison sentences.

Although foreign fighters are mostly male (publicly available figures suggest that men make up approximately 83% of the total number of foreign fighters from Europe (European Parliamentary Research Service, 2018, p. 33)), women are not completely excluded from this phenomenon. For example, in early 2015, an 18-year-old girl from Kumanovo went to Syria, where she allegedly married after her arrival. According to her father, shortly before leaving, she had been communicating online with a girl from Kosovo, and videos with military propaganda content were found on her computer, which her classmates said she had also watched at school. An ethnic Macedonian woman from Struga also joined ISIS and converted to Islam, while another young girl from Aracinovo was prevented by her relatives from traveling to Syria, where she had an arranged marriage with a local foreign fighter. In another case, two girls from rural Skopje also tried to leave for Syria via Pristina in early 2016 but were found and returned by their relatives (Selimi & Stojkovski, 2016). In all of these cases, radicalization occurred online. This is a clear indication that girls are not immune to extremist propaganda, and they must not be excluded from prevention programs.



Radicalization in North Macedonia takes place both online and face-to-face. Very often, young people are targeted online, with certain twisted understandings of Islam being shared with them online, and once they are hooked, they are either redirected to closed groups on Telegram or similar encrypted applications or invited to certain improvised prayer rooms, mosques, and premises of religious NGOs, where they undergo continued radicalization. This was the case with most of the young people who, after receiving radical religious ideology, left for the battlefields in Syria and Iraq in the period from 2012 to 2017.

In the last few years, there has been a notable decline in the number of foreign fighters departing from North Macedonia and the broader Balkan region to conflict zones such as Syria and Iraq. This is largely due to the territorial defeat of ISIS, enhanced international cooperation, and legal frameworks that criminalize participation in foreign conflicts. As a result, the issue of foreign fighter recruitment has diminished in urgency, although the legacies of that phenomenon, such as the return of radicalized individuals, continue to pose challenges.

With the physical caliphate dismantled, attention has increasingly turned to online radicalization, where extremist content continues to circulate across encrypted messaging platforms and social media. Individuals, especially youth, are now more vulnerable to radical ideologies spread digitally, often in isolation from traditional recruitment networks. This shift has also given rise to lone-actor threats, where individuals, radicalized online and acting without direct organizational ties, may plan or commit acts of violence. These actors are more difficult to detect and prevent through conventional counter-terrorism methods.

OVERVIEW OF DOCUMENTED CASES

– CASE STUDY OPERATION “CELL”

The “Cell” case was the largest and most significant case in North Macedonia related to radicalization and recruitment of foreign terrorist fighters (FTFs). According to the investigation, the alleged mastermind behind the operation was Redzep Memishi, a self-proclaimed imam from Skopje. He was known for spreading extremist ideology to young people, both face-to-face in informal religious gatherings and online, using platforms such as Facebook and YouTube to share his preaching. In March 2016, the Basic Criminal Court in Skopje sentenced Memishi to seven years in prison for organizing and participating in a foreign paramilitary group, under Article 322-a of the Macedonian Criminal Code. Memishi pleaded guilty and reached a plea agreement with the prosecution. Five other defendants also received prison sentences (Selimi & Stojkovski, 2016). The case marked a turning point in North Macedonia’s counter-terrorism efforts, drawing widespread attention to the threat of violent extremism, especially among disenfranchised youth. It highlighted the role of local radical preachers and digital platforms in facilitating recruitment and ideological indoctrination. Following this initial prosecution, Macedonian authorities launched related investigations known as “Cell 2” and “Cell 3”, targeting additional extremist networks and individuals suspected of supporting terrorist organizations or planning to travel to conflict zones.

Memishi’s online presence continued to be a potential recruiting tool for Macedonian extremists despite his imprisonment, as online lectures continued to circulate in the virtual space. Today, after serving his prison sentence and being released, the self-proclaimed imam is once again active on social media with his Facebook, Instagram, YouTube, and Telegram accounts.

The case of Redzep Memishi illustrates the persistent influence of ideologically motivated actors in the digital sphere, even after formal criminal sanctions have been imposed. His continued online presence



following imprisonment, and the circulation of his content during and after incarceration, demonstrate the limitations of punitive measures alone in addressing violent extremism. The reactivation of his social media profiles, coupled with a follower base of approximately 16,000 across different online platforms, points to a sustained demand for his messaging and highlights the resilience of extremist narratives in online ecosystems.

From a counter-radicalization perspective, this situation underscores the need for integrated strategies that go beyond legal prosecution to include digital monitoring, counter-messaging, and community-based interventions. The Memishi case exemplifies how offline radicalization structures can transition into enduring online influence, posing ongoing risks for ideological dissemination and potential recruitment, especially among vulnerable or previously exposed individuals. It calls for institutional coordination between judicial systems, cybersecurity agencies, and civil society to prevent recidivism and to mitigate the spread of extremist ideologies in the digital realm.

In addition to the case of Redzep Memishi, in December 2024 and January 2025, North Macedonia confronted critical developments in counter-terrorism efforts with the dismantling of terrorist cells in Gostivar and Struga. In December 2024, authorities uncovered a newly formed terrorist group engaged in recruitment and coordination primarily via digital platforms, including encrypted messaging apps and social media (Telma, 2024). Shortly after, in January 2025, the Ministry of Interior filed terrorism charges against four individuals suspected of affiliation with a terrorist organization. Investigations revealed that this group similarly relied on online communication tools to promote extremist ideologies, share radical content, and maintain contact with like-minded individuals domestically and abroad (Agency for National Security, 2025).

Together, these cases highlight the increasingly digital nature of radicalization and terrorist operations, where internet-based networks facilitate ideological influence, recruitment, and logistical support across national borders. The transnational connections observed emphasize the need for comprehensive cyber surveillance measures and intensified cross-border cooperation within the region. This evolving threat landscape challenges traditional security frameworks, underscoring the necessity of integrating advanced technological capabilities and adaptive policies to effectively counter online radicalization and disrupt terrorist activities in the digital era.

In addition to the aforementioned developments, it is important to recognize the significant role social media has played in the recruitment of foreign fighters for the conflict in Ukraine, despite this not directly involving the dissemination of radical religious ideology. At the onset of the war in 2022, the Ukrainian Embassy in North Macedonia issued a call via its official Twitter account, urging citizens to enlist as volunteers in the International Legion for the Defense of Ukraine (Sloboden Pecat, 2025). However, the Ministry of Foreign Affairs of North Macedonia emphasized that, under the Macedonian Criminal Code, participation in a foreign military force constitutes a criminal offense punishable by a minimum prison sentence of four years. This legal provision was enacted through amendments to the Criminal Code in 2014, following the prior mobilization of Macedonian nationals to conflict zones in Syria as part of ISIS ranks. The legislation aims to prevent extremism and deter the recruitment of Macedonian citizens for foreign conflicts.

This case highlights the complexities of foreign fighter recruitment in the digital age, demonstrating how social media can facilitate mobilization efforts while existing legal frameworks seek to mitigate associated security risks. It underscores the need for continued vigilance and adaptation of national legislation to address evolving methods of recruitment beyond traditional radicalization pathways.



CHALLENGES FOR LAW ENFORCEMENT AND POLICY

One of the primary challenges in countering online radicalization lies in the widespread use of encryption and online anonymity. End-to-end encryption technologies employed by messaging platforms such as Signal, WhatsApp, and Telegram significantly hinder the ability of law enforcement agencies to intercept and monitor communications, even with legal authorization. These platforms are increasingly utilized by extremist actors who exploit the privacy protections to disseminate propaganda, coordinate activities, and recruit followers without detection. While these technologies serve legitimate purposes in protecting privacy and freedom of expression, they simultaneously create operational blind spots for security agencies, who must navigate the tension between ensuring public safety and respecting civil liberties. The use of the dark web is another additional challenge for law enforcement. Although the main business in dark web markets remains illicit drugs (Europol, 2024), terrorists also use the dark web to provide information to fellow terrorists, to recruit and radicalize, to spread propaganda, to raise funds, and to coordinate actions and attacks (Weimann, 2016).

According to Gabriel Weimann, following the Paris attacks in November 2015, ISIS notified its supporters that its official Isdarat website – which hosts propaganda and media releases – had shifted to the Dark Web by providing a “.onion” address accessible via Tor. The group explained this move was a response to persistent efforts to take down its conventional domains and announced the launch of its site on the Dark Web to bypass these restrictions (Weimann, 2016).

A significant obstacle in countering online radicalization is the presence of jurisdictional and legal barriers that hinder timely law enforcement intervention. Radicalizing content is often hosted on servers located in foreign jurisdictions, complicating the process of investigation and content removal due to differing national laws and sovereignty issues. The global nature of the internet allows extremist groups to exploit the “safe havens” of permissive or under-regulated digital spaces, effectively evading enforcement by operating across borders (Weimann, 2016). Furthermore, inconsistencies in legal definitions of key terms such as “radicalization,” “extremism,” and “terrorist content” across different legal systems inhibit coordinated international responses. For instance, what may constitute hate speech or incitement in one country might be protected speech in another, leading to legal ambiguity and enforcement paralysis (UNODC, 2012). These disparities delay mutual legal assistance procedures, limit the scope of extradition or prosecution, and challenge digital evidence collection in transnational investigations. As a result, policymakers and law enforcement must continually negotiate the delicate balance between respecting national sovereignty and responding to the inherently globalized threat posed by online radicalization.

One of the core dilemmas for law enforcement in preventing violent extremism is the difficulty of identifying individuals in the early stages of radicalization. Radicalization often occurs incrementally and in private digital spaces, such as encrypted chat rooms or anonymous forums, where individuals are exposed to extremist content without outward behavioral changes. Many radicalized individuals are “self-starters” who never directly interact with terrorist organizations or known extremists, making them invisible to traditional intelligence methods. Additionally, communities may be reluctant to report early warning signs due to fear of stigmatization or distrust in authorities. On the other hand, not everyone knows how to recognize changes in the behavior of a radicalized person (withdrawal, in some cases aggression towards dissenters, growing a beard (in men)), especially if the person is young, so they often attribute such changes to puberty and the passing phase of youth. These limitations reduce the efficacy of early intervention programs and underscore the need for multi-agency collaboration involving schools, mental health services, and community leaders in identifying at-risk individuals.



Law enforcement agencies struggle to effectively combat online radicalization due to limited resources, including insufficiently trained personnel and outdated technology. The vast amount of extremist content across platforms overwhelms monitoring efforts, while extremist groups use low-cost digital tools to quickly spread propaganda. This digital capability gap highlights the need for greater investment, coordination, and international cooperation to enhance law enforcement effectiveness.

Moreover, law enforcement efforts heavily rely on cooperation from technology companies, but this collaboration is often inconsistent. While major platforms like Meta and Google actively remove extremist content, smaller platforms and encrypted services, including Telegram, have historically been less responsive due to concerns about user privacy, brand reputation, and legal risks, alongside the absence of global standards for content moderation and data disclosure (Organisation for Economic Co-operation and Development (OECD), 2024). However, the Lawfare Institute (2025) notes that, as of 2025, Telegram has markedly improved its cooperation with authorities, responding to regulatory pressure by increasing compliance with data requests and removing illicit content more promptly. Despite these advances, Telegram's encrypted and pseudonymous design still poses enforcement challenges, underscoring the need for sustained public-private partnerships that balance lawful access to information with privacy and platform accountability.

CONCLUSION

Radicalization today is often a hybrid phenomenon involving both offline and online influences, with fully online pathways notably on the rise. The internet and social media continue to play a crucial role in spreading jihadist terrorist propaganda, targeting individuals for radicalization and recruitment into terrorism and violent extremism. But it's important to note that social media is not the cause of radicalization, it's an accelerant. Key platforms for these activities include online forums, video gaming networks, decentralized platforms, and the dark web.

The recruitment process has evolved from broad public propaganda to highly personalized, often private, one-on-one interactions facilitated through encrypted messaging platforms such as Telegram, Signal, and others. These platforms allow recruiters to provide spiritual guidance, emotional support, and operational instructions securely and covertly.

Online platforms have drastically shortened the radicalization process, especially among youth, making countries more vulnerable to fast-spreading extremist ideologies. Young people's heavy social media use exposes them to manipulative content during a sensitive developmental period, increasing their risk of adopting extremist views.

The analysis of radicalization cases in North Macedonia further illustrates these dynamics, showing concrete examples of how social media and encrypted communication have facilitated recruitment and engagement, including among women – a demographic sometimes under-addressed in prevention efforts.

To address this, countries should strengthen digital literacy and critical thinking education, collaborate with tech companies to monitor and remove harmful content, provide early support for at-risk youth, and promote inclusive policies that tackle underlying social issues.

Overall, confronting the challenge of online radicalization demands a multi-faceted and adaptive approach that combines technological, socio-psychological, educational, and policy dimensions. Addressing the personalized and increasingly digital nature of radicalization processes remains pivotal to mitigating violent extremism in the modern era.



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CULTURE OF MEMORY AND IMAGE OF SERBS IN THE PUBLICATIONS BY ARCHIBALD REISS

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ABSTRACT

Purpose: The main purpose of this paper is to investigate political and communicational dimension of Reiss's (Rudolph Archibald Reiss) engagement in changing the media image of Serbs in international context. International and especially Western European countries had demonised Serbs as barbarians and Russophiles, ignoring the Serbian people's readiness to cooperate and sacrifice for the preservation of the ideals of freedom and democracy. The aim of our work is to point out the potential of Reiss's communicological messages, which shaped the field of political sociology, by comparing the image of Serbs in the international environment and domestic public, a topic that is still insufficiently discussed in the academic community. The authors also made a comparative study about the process of demonisation of Serbian people that happened on the very beginning and the very end of the 20th century in order to make a qualitative analysis of the Western auditorium manipulation process.

Design/Methods/Approach: The methodological framework is based on applying a qualitative content analysis, primarily of Reiss's crucial work *Listen, Serbs! Beware of Yourself!* and other scientifically relevant studies, and certain media documents. Additionally, a degree of discourse analysis will also be applied. Furthermore, the authors made a comparative study about the process of demonisation of Serbian people that happened on the very beginning and very end of the 20th century in order to make a qualitative analysis of the Western auditorium manipulation process.

Originality/Value: The main value of the paper is to present the delicate work of Archibald Reiss when it comes to defending Serbian people and their image on international level. Besides, the authors highlight the value of the image creation and auditorium manipulation process analysis that can support certain aspects of foreign policies of Republic of Serbia.

Keywords: Archibald Reiss, culture of memory, media image of Serbs, characterology, propaganda, notion of justice.

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INTRODUCTION

The spirit of time in the Serbian political space at the beginning of the 20th century was difficult to identify, primarily due to the elusive security reality in international relations and the large geopolitical games invisible at the turn of the era. Therefore, for the young state and the ruling elites, in front of European public opinion and large centers of power, which were not in favour of the dynamics of the national movements of the Serbs, but also of the other Balkan peoples, it was important to open up the Serbian national issue. The Customs War of 1906 brought economic independence from Vienna and other states that wanted to control this area, while the First Balkan War of 1912, in addition to the liberation of Old Serbia and Macedonia, and the conflict with Bulgaria the following year, finally marked the end of long territorial disputes and conquest claims of neighbors. The fire of victorious wars was further inflamed by the "covenant thought of liberation and unification" of Serbs separated by state, political and religious borders, and intoxicated by the dreams of national homogenisation, state independence and democracy. The cultural revival was at that time also visible in the political orientation against spiritual colonisation. "They rejected Austro-Hungarian and German colonial patterns as tools of colonial subjugation; they referred to French, British, Swiss, and even American literary and artistic sources" (Ković, 2015: 15). Through culture and literature, the "moral renewal" of the nation was being prepared, but in the deep background there was a political activation of the entire people.²

The generations that actively participated in public life, trying to change the consciousness of the population themselves admitted that they did not achieve great results in the field of politics. The image of Serbs in the European environment was negative, stereotyped and propaganda-oriented, to which the Serbs themselves contributed. Jovan Cvijić, in his program speech *On National Work* (1907), read before King Peter and the members of the "The Circle of Serbian Sisters", argued that Serbia, with its geographical spread "is on the path to Central Europe that does not understand us" (Cvijić, 1907: 346-347), and international blows such as the Peace of San Stefano and the Berlin Congress brought disappointment and distrust towards the international community. Describing the crisis in which the society found itself, he states that "along with this came a turbulent and difficult internal development, which discredited us not only in the eyes of the cultural world, but in several cases even in our own eyes" (Cvijić, 1907: 341). The nation which had decisively contributed to the departure of the Turks from these areas, successfully defending its position against the tutelage and pressures of the Austro-Hungarian Empire, in order to preserve their blood-earned sovereignty, was insufficiently engaged in valorising the results from the military fields when it comes to diplomatic and political practice. It was precisely at this historically important moment that Rudolph Archibald Reiss, a world-renowned

2 Jovan Skerlić, remembering the time of the founding of the Serbian Literary Herald, writes that in this way "in that murky era before 1903, a strong literary and moral group was created, which not only laid the foundations of this magazine, but also had a significant influence on the direction of domestic politics" (Skerlić, 1911b: 415).



criminologist, a Swiss of German origin, appeared, accepting the invitation of the Serbian government to investigate the crimes committed against the civilian population from the very beginning of the First World War. From this stems the subject of our paper – the research of the political and communication dimensions of Reiss's engagement in changing the media image of Serbs in the international, primarily European, public, which demonised them as *barbarians* and *Russophiles* ignoring the national readiness for cooperation and sacrifice for the sake of preserving the ideas of freedom and democracy. The famous criminologist also studied the characterology of ordinary people, highlighting the advantages and disadvantages of a society undergoing change.

The goal of our paper is to compare the image of Serbs in the international environment and the domestic public, to point out the potential of Reiss's communication messages that helped shape the field of political sociology, which is still insufficiently discussed in the academic community. Professor Šuvaković has recently published a book in which he speaks authoritatively about this thesis, but also warns that we have not changed much as a nation. Reiss observed our characterology rationally and from an emotional distance, so it is easier to understand his disappointment with the unwillingness to change our own flaws and behaviours in comparison to those times and phenomena.³

REISS'S CHARACTEROLOGY OF THE SERBIAN NATION

In the text below, we analyse the era preceding the Great World War, its course, but also the period immediately after its end, in which the bureaucracy and the intelligentsia, on the one hand, and the peasantry and the participants in the war, on the other hand, were socially confronted. In the clashes of tradition and modernity, the morality, patriotism and honour of a nation were rapidly disappearing, while greed, betrayal and superficiality overtook their place, thus overshadowing the reality. Specific geographical, historical, cultural, social and security conditions of life created a special psychological character of the Serbian people, firmly rooted in patriarchal upbringing and tradition.

Archibald Reiss, as a skilled psychologist, immediately recognised the importance of shaping a national characterology, based on ethnopsychological profiles of ordinary people. The proof that he was on the right track is the later example of a secret project by the British government just before the German unification, in order to perceive whether a political mistake was possible if the necessary consent was given⁴. Psychological specificities, character and behavioural models shape the mental structure of every society, which is especially pronounced in crisis situations and conflicts. "National character, therefore, is not something given in advance and forever shaped", states Dobrilo Aranitović, concluding that it is "exposed to the processes of change and transformation in the context of historical, social and cultural changes" (Aranitović, 2025: 17). Here we may also add security changes as an important social mechanism in shaping the will of actors who preserve the stability of the system.

The character traits of Serbs have been researched and analysed over a long period of time, but Reiss's works are characterised by the ever-present national spirit and feelings. Carefully observing Serbian society during an important decade in its historical development, he noticed how in security crises and spiritual fractures, social stratifications surface, and with them all the flaws and virtues of the entire nation. By carefully observing and analysing their consequences, Reiss left a legacy of Serbian

3 See more in: Šuvaković, U. (2024): R.A. Reiss - Neutrality is not possible in the face of crime, Matica Srpska, Novi Sad; Archives of Vojvodina, Novi Sad and Faculty of Teacher Education, University of Belgrade.

4 In the secret protocol, English ethnopsychologists saw the Germans as a people focused on themselves, prone to self-pity, with a pronounced need to be loved and without the same feelings for others. The negative sides of the German mentality are aggressiveness, rudeness, arrogance, fear, inferiority complex, self-indulgence and sentimentality. Their tendency to exaggerate is expressed especially in self-overestimation (Schneider, S.: "Who are the German", *Borba*, 1-2 September, 1990).



characterology, which is also important from the perspective of contemporary political sociology. In psychology, such teachings are close to the views of the Englishman William McDougall,⁵ who, through the theory of instinct, determines the behaviour of individuals, but also of the entire social groups in crisis situations. Exposed to various cultural, religious and ideological pressures, Serbian identity bowed before the onslaught of foreign influences - unification in the West and Christianisation in the East. Reiss excellently identifies the temptations to which an entire nation is exposed, especially during the war, understanding that collective behaviours, cultural patterns, and ethical values define the logic of identity features, because culture and its heritage are undeniably one of the most important segments of national identity (Arsenijević, Perić, 2025).

The long suppression of national identity in the centuries-old Ottoman and German environment influenced the mentality of the Serbian people, as well as their character traits. Reiss analyses the victims of the crime phenomenologically, paying attention to the way in which they put their own experiences in the foreground, but also to the status that the community assigns to them after the war is won. The Serbs brought everything into the war, and received a disingenuous Yugoslavism that worked to destroy its own home from day one.⁶ Collective behaviour was often characterised by impulsive and irrational decisions, with Serbs rarely admitting their own mistakes. Describing the political agenda of that time, Vasa Čubriločić states that Serbia was “the *apogée* of civic parliamentarism”, which can be compared to the most developed European countries: “With the Constitution of 1903, Serbia, as a constitutional and parliamentary monarchy, became a European-bourgeois state. This Constitution did not break its old bureaucratic system, but public opinion in the country was so strongly democratic, and the ruling power was so tamed, that Serbia was truly one of the most democratic civil states in the Balkans from 1903 to 1914” (Čubriločić, 1958:377). Belief in the common good formed the basis of public policy, but many individuals in power did not support these principles in practice. Reiss does not tolerate the hypocrisy of the elites, especially targeting their corruption: “Your people are brave... patriotic...hospitable...democratic, bright...”. Reiss praises, but at the same time criticises: “You are not great workers...you lose pride in wealth...you have become terribly ungrateful...you are jealous of those more educated, more refined and more advanced than you...”.⁷ The work on national education implies collective engagement, where the Swiss professor observes how, after major wars and crises, the masses prefer to indulge in rhetorical emotional promises rather than realistic cognitive judgments. “I will not hide anything important from you of what I have seen, because a true friend is not one who flatters you, but one who tells you the truth, the whole truth”, the author is honest, singling out ingratitude as a flaw with disastrous consequences for society: “You have become terribly ungrateful. Thus, your capital, Belgrade, once a martyr city, even today, ten years after the war of liberation, does not have the smallest cross, nor the smallest stone that would preserve the memory of the sacrifice of those who liberated you” (Reiss, 1997: 2-14).

5 A famous English psychologist important for the development of instinct theory and social psychology. He was an opponent of behaviourism, arguing that human behaviour is always goal-directed, defending the thesis that individuals are always motivated by a significant number of inherited drives. See more in: McDougall, William (1909): *An Introduction to Social Psychology* (2nd ed.), London: Methuen & Co, pp. 1–2 (n13–14 in electronic fields).

6 Belgrade's inability to govern the state it created itself was already evident during the conflict between Kosta Stojanović, Minister of Trade in the government of the Kingdom of Serbia, and Anton Korošec, leader of the Slovenian People's Party, in early October 2020. “The country is in difficult financial circumstances, and the cause of this position is not only material misfortunes, but also the difficulties we find ourselves in due to divergent views on the consolidation of our state, which go so far as not to hide and seek the destruction of the state that is being created... If I agreed to such an obvious way of sabotaging finances and loans, it would mean that I am an accomplice with Mr. Korošec and his party, that I am sitting in a government that is going to the elections for the Constituent Assembly, consciously preparing the country for anarchy and disorder.” (Stojanović, 1920v).

7 “Your ordinary, the peasant, uncorrupted by the influence of professional politicians, is not corruptible. Your ‘intelligentsia’ is, from the smallest official to the minister.” Reiss, Archibald *Ecoutez Serbs!* (2006): 1997, pp 2-14.



Frequent references to easy social forgetfulness reveal his anger towards the elites of the time who did not see what was happening around them, who were greedy and incapable of helping the people who brought freedom. Addressing the entire nation, he warns against national bias and loyalty to leaders as dangers that distance society from democratic frameworks. From a discursive point of view, he shows us how the process of interpretation can lead to different types of social stratification, thereby polarising public opinion. Although in the early 1920s Edward Louis Bernays was just laying the foundations in the field of propaganda and public relations, Reiss noticed, before he did, the power with which the media portray reality, but also erase the past,⁸ to which the Serbian people were (and are) exposed then, as well as now (Perić, Jevtović, 2024, 2025). At the same time, the participants in the war skillfully use the carelessness and unpreparedness of the Serbs for the propaganda battle, trying to generalise the shortcomings of one people in the press as a limitation that is transferred to the entire country. For example, the Bulgarians apply this trick by pointing out the lack of schools in Macedonia, presenting the Serbs in the West as the sole culprits. Reiss recognises the technique of transferring responsibility in crisis reporting, and advises our authorities: "So, establish schools that will be centers for education and nationalisation. But do not send just anybody to be a teacher. Send the best people and single out the teachers in Macedonia with a decent salary, because these people are the pioneers of Serbism..." (Reiss, Bonasije, 1919/1921: 311). He strategically responsibly investigates the misuse of traditional values in creating propaganda narratives that overshadow the domestic public, and which only benefit the already separated corrupt elite. He is concerned about the silence of our official bodies and the slowness in reacting to imposed narratives, full of sensationalism, one-dimensionality.

REISS'S IMAGE OF SERBS IN THE WORLD AND DOMESTIC PUBLIC

By interpreting and analysing the reporting, we will see how the stereotyped image of Serbs was formed, how intense and increasingly ruthless it was, with the comprehensive and skillful use of hostile propaganda that aimed at the collective flaws of the targeted people. The expert from Lausanne, with his texts in the European media, significantly improved the stereotyped and propaganda-negative matrix about Serbs during the time of the Kingdom of Serbs, Croats and Slovenes, which is given additional weight by the fact that by participating in the Serbian army (as a volunteer) he objectively and credibly testified about the crimes committed against the civilian population. "The big media that like to exercise its fact-checking machinery on often minority and financially weaker competition, are reluctant to recall their own mistakes, lies and malfeasance", writes Serge Alimi, noting how they force "self-justifying rhetoric" (Alimi, 2020: 21). Considering the migration movements of the Balkan population, Reiss singles out the character of the Serbs, taking into account historical and geographical factors. Although he was drawn into the conflict in order to research into the crimes of the Austro-Hungarian army, he soon expanded his field of engagement to include broader expertise on all victims of the war, especially the crimes of the Bulgarians in the areas of Macedonia, southern Serbia, and Kosovo and Metohija. Reiss is a direct witness to the horrors and suffering he was exposed to, and what is being kept silent about in Europe. By sincerely deciding to communicate the truth, he moves in the circle of rare European intellectuals who loudly point to the destruction of people because of their ethnicity, revealing the marginalised side of the war in which Serbs were allowed to be killed. His texts are uncompromising, sharp, painful and loaded with facts, where in the name of "higher goals" the people of the victims are sacrificed on the altar of rights and freedoms of European values.

⁸ "The three elements of public relations in practice are as old as society: informing people; persuading people; and integrating people with people. Of course, the means and methods of realising goals have changed as society itself has changed," says Bernays. (Bernays; 1952: 3).



The silence of Europe is ominous, which is why his texts have an incredible resonance in public opinion, especially in those countries that were against the war. Unlike the German, Austro-Hungarian or Bulgarian press that demonised the Serbs as “barbarians”, he says the following, writing about the act of their courageous resistance: “You are giving the world an example that has never been seen before and that will not be forgotten. Before the war, in our vanity of “Europeans”, we often underestimated you as “Balkans”. After this gigantic struggle, when the name of Serbia is mentioned, one must take off one’s hat” (Reiss 2014: 18).

Reiss is among the few in Serbia who understood that war must be waged simultaneously in two realities: real and symbolic, because he knew how: “the media easily build a perfectly shaped world of stereotypes, symbolically seductive, but also experientially identifying” (Jevtović, A. 2022: 1064). A prominent doctor, a forensic scientist from Lausanne, after submitting to the Serbian authorities a documented report on the crimes of the Austro-Hungarian army with evidence of the use of ammunition prohibited by international conventions, held a major press conference at which he informed the world media about the scale of the crimes against Serbs.⁹ In order to awaken the dormant intellectual public of Europe, he gave several lectures on the crimes against Serbs at the Sorbonne, and in London in 1916 he published a book illustrated with numerous examples - *Austro-Hungarian Atrocities*. Taking care not to damage the newly restored ties with the European centers of power, the Serbian authorities did not dare to publish this major work even after the end of the war, so the same practice continued in AVNOJ federal state, when it was kept quiet so as not to damage relations with the “fraternal republics”.¹⁰ Reiss’s contribution to the media field is immeasurable: several books and over 800 articles in widely read and respected world newspapers changed the image of the Serbs, giving them communication visibility and awakening world public opinion. In the most difficult times of crisis, between 1914 and 1918, through the *Lausanne Gazette*, the public read about the real situation on the battlefields where Serbs were actors, and many did not like the truth. In the German-speaking world, the oldest daily newspaper, *Neue Zürcher Zeitung*, was particularly critical of the professor’s engagement, claiming that “the Serbs paid him for it” and that he was secretly working for the interests of France, as its agent. Reiss gave them as good as he got, because he used the right of reply to forward piles of photographs and evidence of crimes, enriched with statistics that no lie or manipulation could deny.¹¹ The tactics of the European media, which silenced, minimised and reduced Serbian suffering to rare, isolated examples, were demystified by a prominent criminologist whose authority was beyond doubt. Reiss restored a picture that was not in accordance with the simplified matrix of Serbian guilt, destroying the propaganda scenario that had previously branded the culprits. Black and white images within the media demonisation of Serbs, supported by the dominant political, military and security architecture, fell before the truth that came from the addresses of various world media inspired by the evidence of Archibald Reiss.

9 Reiss collected evidence in the field that soldiers of the 16th Varaždin Regiment “Freiher von Giesl”, the 26th Karlovac; 27th Sisak and 28th Osijek Home Guard Regiments; 28th Viktor Emanuel Regiment, 78th Osijek Regiment “Gerba”, 78th Karlovac Regiment “Romanian Crown Prince Ferdinand” and the 100th Infantry Regiment “Freiher von Stejberg” used prohibited ammunition to shoot live targets.

10 From the Report of Professor Reiss, which was submitted in April 1915 to the Prime Minister of Serbia, Mr. Nikola Pašić, it is clear that the responsibility for the war lies with the top of the Austro-Hungarian monarchy, with the wholehearted diplomatic assistance of the Vatican and the support of the Austrian, German and Bulgarian press. “Indoctrinated Austrian soldiers, often of Slavic origin, spread lies about Serbs and Serbian soldiers, presenting them as barbarians, savages, robbers and murderers.”

11 “In the Pocer, Mačva and Jadar districts and in seven municipalities outside them, 1,300 civilians were killed. Among the killed were 994 men and 306 women... As for the manner in which they were killed, the statistics are as follows... killed with a rifle 34/564; bayoneted 181/64; hanged 7/6; slit open 2/4; burned alive 35/96; cut off nose 28/6....” (Reiss’s Letter, 17th March, 1915.).



The same assessment applies to the image in the Serbian public, especially in its culturally influential section. The recognition first comes from *Politika*, which confirms the great diplomatic progress on the international scene, accepting it as part of Reiss's reporting: "The world public was horrified by the monstrous deeds of our enemies, who felt Reiss's blow", and even after that he continued to "fight for the Serbian cause with words and pen", 1921 (1921: 1). Considering the Serbian public, we highlight Reiss's writings in the oldest and most influential daily newspaper *Politika*, in which he, irritated by the inadequate social status of war participants, insisted on building a *culture of remembrance*. Forgotten heroes, neglected cemeteries of soldiers and fallen civilians, indifference towards heroic victims and deeds... aroused in him a sense of shame and disgrace, so the honorary reserve captain first class now continued the fight on the pages of the oldest and most influential daily newspaper, calling for the awakening of national pride. This means that Reiss excellently recognised, identified and explained the concepts and perspectives of the development of Serbian society. By comparing it with the contents of the *Police Gazette*, a newspaper of the time that interpreted and explained deviant phenomena from a police perspective, we understand how vulnerable post-war society was: "They reveal connections within society, cracks in the police and judicial systems, and the vulnerability of the community, reinforcing the tendency to emotionally connect the audience with the protagonists of criminal activities" (Jevtović et al. 2023: 118).

Reiss as a skilled communicator whose sources of information came from the very top of the state, did not hesitate to criticise ministers and intellectuals of the time for being fashionable and short-lived. Already in the interwar period, Reiss saw changes, Europeanization and the influence of different fashion, customs and behaviour among the people, which were not characteristic of Serbs, Topalović and Berić note, concluding that Reiss wanted to warn the Serbian people with a kind of rebuke that traditional values and customs were being lost in the face of "unbridled snobbery and increasing immorality" (Topalović, M.; Berić, J.: 2023: 58). Recognising the interests of political elites, he understood that their actions were changing traditional ethical patterns, not only in the sphere of politics and culture, but also in public policies in general. In a comprehensive interview published on September 11, 1928, he honestly admitted that in defending the truth about Serbia, he "went to war with half of the world", spent almost all his property, and neglected even his family, who did not approve of his propaganda engagement. How accurately he predicted our character and behaviour in crises is shown by this sentence: "If black clouds once again loom over this country, it should not be a surprise, because it will be nothing more than what its people themselves have been preparing for" (*Politika*, 11.09.19286).

CONCLUSION

Factually precise, journalistically grounded, Archibald Reiss used his stay in Serbia, before, during and after the Great War, to change the values of the propaganda-imposed image of the West about Serbia as a "barbarian state" into an acceptable and truthful narrative about a "loyal European ally" and a people who became victims of ethnic cleansing. This work pointed to a lesser-known area of his engagement, because in addition to criminalistics and forensics, he made a great contribution to the sphere of communication studies, especially the media image of Serbs in the European and world public. However, it can be noted that regardless of Reiss's great efforts, the West had a well-established attitude towards Serbs, which in terms of media narrative began to re-emerge in the late 1980s, escalated to a large extent in the 1990s, and has been constantly present since then (Perić, 2019; Mitrović, Perić, 2022).



As a war reporter, he had justice and truth at the center of his reporting, and his sometimes romantic approach to the fight against the violence of the then centers of military power and state imperialism shows that consistency and knowledge ultimately open the locked gates of propaganda power in a marketing campaign. Writing for a newspaper from Lausanne, as well as numerous press outlets around the world, the Swiss scholar overturned the dominant narrative about Serbs responsible for world conflicts, proving that they are victims with a burden of suffering that very few nations on the planet could bear.

As an investigator and witness to war crimes, he does not take sides, pointing out to Serbs the virtues and flaws with which they can predict their own actions in crisis situations. For the history of social, class and socio-political relations in the young state, this is a valuable contribution to the constitution of the broader characterology of the Serbian people, especially the new elites and progressive currents of national thought.

In the contemporary public sphere, “the memory of his character and work is used to point out certain phenomena in Serbian society or to confirm an argument regarding some of our characteristics”, researchers write (Vujanović, J. 2023: 120). The culture of memory, for which he advocated so much, protects him from collective oblivion nowadays. The man whose heart remained in Kajmakčalan, a great humanist and sincere friend of Serbia, will be remembered as a reporter who changed the course of the propaganda war, which is why the Supreme Command of the Serbian Army said that he was worth “as much as a division”. The extent to which the Serbian people respected him is also proven by the obituary on the front page of *Politika* after his death: “A great friend of our people has departed his life; and more than a friend, one of our own, and to a great extent one of the valuable collaborators in our Liberation” (*Politika* 1929, 1).

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III

CONTEMPORARY CHALLENGES IN DETECTING AND PROVING CRIME



OBSTACLES FOR MIGRANT WOMEN TO OBTAIN REFUGEE STATUS

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ABSTRACT

Purpose: The text identifies the discriminated position of women as refugee seekers in the context of international law, which has for decades stereotypically recognized male refugee seekers who come from the areas of current armed conflicts. This has led to difficulties in recognizing women who find themselves in equally serious danger due to the existence of structural, gender-based violence.

Design/Methods/Approach: A desk analysis of international and domestic regulations which recognize gender-based violence as a basis for obtaining refugee status is to be applied. Data from the reports of the Commissariat for Refugees of Serbia, international organizations, non-governmental organizations and media reports on the situation of “women on the move” (migrant women and refugees) in Serbia are used. The European Union set standards in the directives from 2011 and 2013 so that gender-based violence, including rape, sexual violence, domestic violence, female genital mutilation, and forced marriage, can be recognized as a form of legally relevant persecution. Serbian policy and practice are presented.

Findings: It is pointed out how women victims of structural violence (do not) fit into the provisions of international public law when they have to prove that they are threatened with persecution of serious human rights violations or serious physical injuries in their country of origin. Apart from the difficulties in proving and accepting the existence of gender-based violence, the trend of introducing migration restrictions is becoming more and more intense globally, which makes the situation even worse for women.

Originality/Value: At a high international level, the paper connects the issue of the urgently needed demographic renewal of Europe with the issue of realizing the dignity of all migrants. The reception of migrants alleviates the problems associated with the accelerated aging of the population in the developed countries of the West. Employers recognize the value of diversity in the workforce, while the integration of immigrants into the education system and the labor market increases overall productivity and reduces social frictions.

Keywords: gender based violence, obtaining refugee status, women as asylum seekers, EU standards, Serbian policies and practices

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PURPOSE

The text identifies the discriminated position of women as refugee seekers in the context of international law, which has for decades stereotypically recognized male refugee seekers who come from the area of ongoing armed conflicts. This leads to difficulties in recognizing women who find themselves in equally serious danger due to the existence of structural, gender-based violence.

Wars, dictatorships, economic, political, and other insecurity created millions of refugees in the world. According to the United Nations, about 122 million people are displaced worldwide. (Martin, 2025, July 11) Migration and refugee waves occur due to conflicts, humanitarian crises, or economic insecurity. Political factors, conflicts, instability, persecutions, but also climatic factors, for example, are important causes, along with changes in the environment, floods, and droughts. (Mršević & Janković, 2023: 143) "The numbers are catastrophic and show us that some people know how to inflame conflicts quite quickly, but also that they are too slow when it comes to finding solutions." The result is the destruction, persecution, and suffering of millions of people who were forcibly expelled from their homeland. (Insider, 2024, April 4) Women often use the wave of refugees and migration to escape from persecution and violence, actually from patriarchal relations in the countries of their origin, and gender-based violence and discrimination based on them, most often from Afghanistan and Pakistan (Mršević, Janković, 2018: 55-67).

Women as refugee seekers in the context of international law are discriminated against, as male refugee seekers have been stereotypically recognized when coming from the area of current armed conflicts. This leads to difficulties in identifying women who are equally in danger due to the existence of structural, gender-based violence. (Mršević, 2024: 40)

Overview 1: The course of the asylum procedure with critical points

1. Arrival and entry into the host country - 1951 Convention, 1967 Protocol.

Critical point: Risk of violence during travel and at the border; women often do not report for fear of deportation. (United Nations, 1951, 1967).



2. Submitting a request for asylum - Directive 2011/95/EU, CEDAW

Critical point: Lack of gender-sensitive examination; insufficient training of officials. (European Parliament, & Council of the European Union, 2011); (United Nations, 1979).

3. Interview and assessment of requests - CEDAW, Istanbul Convention

Critical point: Hard to prove gender-based persecution; cultural barriers, and trauma. (United Nations, 1979); (Council of Europe, 2011).

4. Temporary accommodation - Istanbul Convention, UN Declaration on the Elimination of Violence against Women.

Critical point: Risk of sexual violence in camps; lack of safe spaces for women. (Council of Europe, 2011); (United Nations General Assembly, 1993).

5. Decision on asylum - Convention from 1951, Directive 2011/95/EU.

Critical point: Decisions based on a narrow interpretation of “persecution” without a gender perspective. (United Nations, 1951); (European Parliament, & Council of the European Union, 2011).

6. Complaint procedure – Convention against torture, CEDAW.

Critical point: Long deadlines; lack of free legal aid; re-traumatization. (United Nations, 1979, 1984).

7. Integration or deportation - CEDAW, Istanbul Convention.

Critical point: Discrimination in employment and access to services; risk when returning to the country of origin. (United Nations, 1979); (Council of Europe, 2011).

DESIGN/METHODS/APPROACH

A desk analysis of international and domestic regulations is to be applied, which recognizes gender-based violence as a basis for obtaining refugee status. Data from the reports of the Commissariat for Refugees of Serbia, international organizations, non-governmental organizations, and media reports on the situation of “women on the move” (migrant women and refugees) in Serbia are used. The International legal framework provides for gender-based violence that can seriously endanger the life and bodily integrity of women as one of the prerequisites for asylum granting, but many states do not recognize it in the practices of granting asylum. That is why the European Union set standards in directives from 2011 (Qualification Directive) and 2013 so that gender-based violence, including rape, sexual violence, domestic violence, female genital mutilation, and forced marriage, can be recognized as a form of legally relevant persecution. The Serbian Law on Asylum and Temporary Protection from 2018 also includes sexual and gender-based violence as acts of persecution, but in practice, not many women are beneficiaries of these legal provisions.

EUROPEAN UNION POLICIES AND PRACTICES

The procedure for obtaining asylum in the European Union is a complex legal process based on international, European, and national norms. The normative framework consists primarily of the Convention on the Status of Refugees from 1951 and its Protocol from 1967, which establish the basic



criteria for recognizing refugee status (UNHCR, 2010). At the level of the European Union, the key legal instrument is Directive 2011/95/EU (Qualification Directive), which establishes standards for the qualification of refugees and persons in need of subsidiary protection, as well as their rights (European Parliament & Council of the EU, 2011).

Table 1: *Categories of obstacles for migrant women in obtaining refugee status*

Barrier Category	Description	Practical Examples	Relevant Legal Instruments
Legal framework	Lack of clear recognition of gender-based persecution or gender-specific provisions in asylum laws.	National law recognizes persecution but is not explicitly based on gender; restrictive interpretation of “persecution” (e.g., Hungary, B&H).	Convention Relating to the Status of Refugees (1951), Directive 2011/95/EU, CEDAW
Procedural barriers	Lack of gender-sensitive approach during interviews and assessments; insufficiently trained staff.	Interviews conducted in the presence of male interpreters for survivors of sexual violence; no private space for discussions (e.g., Greece, Croatia).	CEDAW, Istanbul Convention, UNHCR Guidelines on Gender-Related Persecution
Proof of persecution	Difficulty in gathering evidence for gender-based violence, especially when it occurs in private spheres or during transit.	Lack of medical documentation; irreversible loss of evidence due to delayed reporting (e.g., Turkey, Malta).	CAT, Istanbul Convention, CEDAW
Access to legal aid	Insufficient availability of free legal assistance, particularly in remote or transit centers.	Dependence on NGOs and UN agencies (e.g., North Macedonia).	CEDAW, EU Procedure Directive, 1951 Convention
Accommodation and safety	Mixed reception centers without dedicated spaces for women and children; risk of violence in camps.	Placing female survivors of violence in the same spaces as perpetrators, poor hygiene conditions (e.g., B&H, Greece).	Istanbul Convention, UN Declaration on the Elimination of Violence Against Women
Health and psycho-social support	Lack of mental health services and healthcare adapted to women’s needs.	Lack of gynecological and psychological support in rural centers (e.g., Malta, Croatia).	CEDAW, Istanbul Convention, ICESCR
Socio-cultural barriers	Distrust of institutions, stigma, language, and cultural barriers.	Refusal of interviews due to the presence of a male interpreter; fear of community judgment (e.g., Turkey).	CEDAW, UNHCR Guidelines, Istanbul Convention

The applicant for asylum is obliged to prove the existence of persecution, serious violations of human rights, or other forms of serious damage in the country of origin. The grounds for granting international protection are defined through several categories of persecution. The most frequently mentioned are:

- political persecution, which includes the fear of repression due to political beliefs, actions or belonging to political organizations;
- religious persecution, which includes discrimination or repression based on religious beliefs and practices;



- persecution based on belonging to a national group;
- persecution due to belonging to a certain social group, which includes gender, sexual and other identities exposed to increased risk of violence and discrimination;
- racial and ethnic persecution (UNHCR, 2010).

Competent authorities of member states use additional criteria when making decisions, among which the credibility and consistency of the applicant's statement, as well as their compliance with available evidence and reports on the country of origin, are especially valued (European Asylum Support Office - EASO, 2021). The subjective assessment of the applicant is complemented by an objective analysis of the situation in the country of origin, including the existence of systemic violations of human rights, the state of gender equality, and the degree of protection of women from gender-based violence (Council of Europe, 2014).

Despite the formally established standards of protection, in practice, women face specific and multiple obstacles in exercising their right to international protection. These obstacles further complicate the recognition of refugee status and the exercise of the right to asylum. Therefore, the need for a more consistent application of a gender-sensitive approach in asylum procedures is emphasized, in accordance with the obligations from the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW, 1979) and the Istanbul Convention of the Council of Europe (2011), which particularly emphasize the obligation of states to ensure the protection of women from gender-based violence and discrimination.

The applicant for asylum is obliged to prove the existence of persecution, serious violations of human rights, or other forms of serious damage in the country of origin. The grounds for granting international protection are defined through several categories of persecution. The most frequently mentioned are:

- political persecution, which includes the fear of repression due to political beliefs, actions or belonging to political organizations;
- religious persecution, which includes discrimination or repression based on religious beliefs and practices;
- persecution based on belonging to a national group;
- persecution due to belonging to a certain social group, which includes gender, sexual and other identities exposed to increased risk of violence and discrimination;
- racial and ethnic persecution (UNHCR, 2010).

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THE EUROPEAN UNION AND GENDER-BASED VIOLENCE

European Union countries recognize gender-based violence as a basis for granting asylum to women. This is based on a number of EU directives and guidelines which recognize that women exposed to gender-based violence may have valid reasons for seeking international protection.

One of the key documents is Directive 2011/95/EU (Qualifications Directive), which sets standards for qualifying third-country nationals or stateless persons as entitled to international protection. According to this directive, gender-based violence — including rape, sexual violence, domestic violence, female genital mutilation, and forced marriage — can be recognized and accepted as a form of persecution. Also, Directive 2013/32/EU (Asylum Procedures Directive) and Directive 2013/33/EU (Reception Directive) provide additional guidance on procedures and conditions for asylum seekers, including the special needs of women survivors of gender-based violence.

The recognition of gender-based violence as grounds for asylum depends on the specific circumstances of each case and on how laws and policies are implemented in each EU member state. Nevertheless, it is a widely accepted rule that women who are victims of such violence have the right to protection in accordance with international human rights law and EU standards.

Women on the move - the example of Germany

In 2015, the Federal Republic of Germany opened its borders to hundreds of thousands of people, many of whom were fleeing Syria and Afghanistan. In 2015 and 2016, the majority of the approximately 1.2 million asylum seekers in Germany came from Syria, Afghanistan, and Iraq, and men were disproportionately present. In contrast, the subsequent wave of refugees from Ukraine had a different gender composition, with women accounting for three-quarters of Ukrainian citizens seeking refuge. The problem that has been noticed is that many women who arrived in the last ten years do not work, which raises the question of what obstacles they face and how they are solved (Gregson, 2025, August 10). The example of Germany provides insight into those challenges and attempts to overcome them.

The employment level of refugee women is significantly lower than that of men - about two-thirds of women remain unemployed even after eight years of residence in Germany. Compared to the unemployment rate of about 15% among adult male refugees, this difference indicates the multiple disadvantaged position of women. Many men who come to Germany are single, while many women arrive with small children. This puts them at a disadvantage when it comes to attending German language courses or using the various services provided by the state.

Some refugee women have never worked in their home countries or have been employed in sectors such as education or health, which require high language competence and are strictly regulated in Germany. In contrast, men are more easily employed in sectors that do not require a good knowledge of the German language, such as construction work or delivery services, which allows them to find employment more quickly. Therefore, compared to men, women are more often faced with the situation of having to start from scratch.

In addition to institutional assistance, refugee women are also supported by projects of non-governmental organizations. The “Work for Refugees” project works according to the motto “find a job first”. The best and fastest way to learn a language and establish contacts is through employment. “Tent Germany” also organizes job fairs and helps refugees find work through a network of 80 companies. Numerous civic projects and organizations employ women who were themselves once refugees in Germany and their personal experiences allow a better understanding of the challenges other refugee women face.



Serbia: policies and practices

Gender-based discrimination is still one of the most dominant forms of discrimination in Serbia, which becomes even more pronounced for female migrants due to their intersectional situation, given that gender identity deeply shapes the migration experience (GIZ Serbia, 2024). Refugee women are marginalized multiple times, as a considerable number may face various forms of violence as there is often no adequate and effective system of protection and support.

The researchers of NGO Athens recorded many testimonies of refugee women in Serbia that show that migrant women are victims of physical violence, rape, forced marriages, labor exploitation, and forced prostitution, i.e., sex for survival in order to provide food or shelter. The perpetrators are usually members of the police, partners, and smugglers, and violence also occurs in places that should be safe, such as reception centers. Paradoxically, women traveling with a partner and children are much more likely to be victims of violence than women traveling alone. Women accompanied by a male family member are not necessarily more protected from abuse and may also become victims of the police, smugglers, or their own family members (M. R., 2017, December 12). Forced migrant women² may be victims of sexual violence, human trafficking, or other forms of abuse. Illegal migrant women³ may be exposed to exploitation, discrimination or violence because of their social position or lack of legal status.

In 2023, 2,614 people were staying in 14 centers for refugees and migrants active in Serbia and were given “help as people who, through no fault of their own, lost everything”, as stated by the Republic Commissariat for Refugees and Migration (Beta, 2023, Jun 20). Although their number is decreasing, intolerance towards migrants is growing, especially in places where reception centers are located. Groups of citizens of Šid, Pirot, Sombor, Kikinda, and Kanjiža organize “hunts directed against the migrant population” on social networks (Marinković, 2019).

Serbia really does not have a large number of refugees compared to neighboring countries; the number of refugees, migrants, and asylum seekers in 2025 is approximately 20,000 to 30,000, while the constant number of refugees in Serbia is between 5,000 and 6,000 people (Tanjug, 2022, Jun 20). In mid-2025, it is reported that women make up 7% of refugees in Serbia (UNHCR, 2025). A growing trend in the number of refugees, mostly from Asia and Africa, has been recorded. Forty percent of refugees in Serbia come from Afghanistan, but there are also migrants from Syria, Somalia, Bangladesh, Pakistan, and India.

Although daily more than 250 people enter Serbia from the south, there are also constant attempts to leave Serbia in the north. The Hungarian practice of forcibly returning people to Serbia and stopping them at our borders creates crowds and complicates the humanitarian situation for migrants and local communities (Tanjug, 2022, Jun 20). The UNHCR Age, Gender, and Diversity (AGD) policy measures will be adjusted to the Serbian context and implemented within the timeframe of this Strategy, ensuring that no one is left behind by providing information adapted and accessible to children, youth, older persons, and persons with specific needs. (UNHCR Serbia, 2025)

States that have signed the Convention on the Status of Refugees, including Serbia, have the responsibility to provide these persons with security from returning to their country of origin, respect for human rights, access to asylum procedures, and assistance in finding long-term solutions. Persons who

2 Forced migrants are people who are forced to leave their country or area for specific reasons, often due to coercion or force. This can include various situations, such as conflicts, wars, genocide, persecution, or other forms of violence and vulnerability. Forced migrants often suffer great hardships while looking for a safer place to live, and their situation is different from ordinary migrants who decide to leave their homelands on their own for better conditions or other reasons.

3 Illegal migrants are persons who cross the country's borders without authorization or a visa, or who remain in the country after the expiration of their residence permit. They often have no legal status or protection in the country they are in, making them vulnerable to a variety of problems, including exposure to violence, exploitation and deportation.



are in the process of obtaining asylum or have been granted asylum have the right to legal residence, work, education, health care, and several other rights.

The language barrier further complicates the situation for those who do not speak Serbian or English (most of them are women), which limits their employment opportunities. However, according to UNHCR data, slightly more than a third of refugees and asylum seekers in Serbia have higher education, and more than half of them have completed high school.

The Commissariat for Refugees has repeatedly called on employers to recognize the potential of refugees as a new workforce, because their engagement is not only a matter of social responsibility, but also an opportunity for innovation and company growth. In the period from 2019 to 2023, as many as 72% of refugees declared that they were employed (Djordjević, 2025, August 8). Forty-two percent of refugees and asylum seekers who applied to the UNHCR office in Serbia received work assignments. It was observed that they often look for work on their own and find their way on the labor market, while for support, they most often turn to UNHCR and competent institutions such as the Commissariat for Refugees.

UNICEF implements programs to combat gender-based violence in emergencies, including the establishment of safe spaces for women and girls, and documents examples of good practices to ensure that women and girls are at the center of prevention and interventions (UNICEF Serbia).

News in Serbian regulations that favor women on the move

1. *Law on Asylum and Temporary Protection (2018)* contains a number of gender-sensitive provisions:

Principle of non-discrimination (Article 7): Any discrimination is prohibited, especially on the basis of race, skin color, sex, gender, gender identity and sexual orientation.

Principle of gender equality and sensitivity (Article 16): Provisions of the law are interpreted in a gender-sensitive manner. The applicant, at his/hers request, is allowed to have his asylum application heard by a person of the same sex. Also, the presence of a translator or interpreter of the same gender may be mandatory. Women accompanied by men seeking asylum have the right to apply and make a statement separately from their companions.

The principle of providing special procedural and acceptance guarantees (Article 17): In the asylum procedure, account is taken of the specific situation of persons who need special guarantees, including minors (accompanied or unaccompanied), persons with disabilities, elderly persons, pregnant women, single parents with minor children, victims of human trafficking, seriously ill persons, persons with mental disorders, as well as persons who have been tortured, raped or exposed to other forms of severe psychological, physical or sexual violence, including female victims of genital mutilation.

Right to asylum (Article 24): Refugee status is granted to an applicant who is outside his or her country of origin or country of habitual residence and who justifiably fears persecution because of his or her race or gender.

Acts of persecution (Article 28): They include physical or psychological violence, including sexual and gender-based violence.

Perpetrators of persecution or serious injustice (Article 29, paragraph 1, point 3): They can also be non-state entities, i.e., private persons, if it is proven that state authorities or organizations that control a significant part of the state territory are unable or unwilling to protect from persecution or serious injustice.



2. Access to the labor market for refugees and asylum seekers

Refugees and asylum seekers do not need a work permit for employment in Serbia. With the amendments to the Law on the Employment of Foreigners, refugees can be legally employed with an identity card issued by the Asylum Office of the Ministry of Internal Affairs, while asylum seekers must submit a confirmation of their status to the employer. Between 2019 and 2023, 72% of refugees reported being employed (Djordjević, 2025, August 8).

3. Guide for career guidance of refugees

A guide has been prepared that provides information on the recognition of the degree of education acquired abroad, enrollment in school or college, learning the Serbian language, retraining, employment and counseling on these topics (Djordjević, 2025, August 8).

FINDINGS

International law recognizes gender-based violence, including various forms of gender-based discrimination and abuse, human trafficking, and other forms of violence against women, as valid grounds for seeking international protection or asylum. In such cases, women can prove that they are personally endangered and demand protection from competent institutions, but in practice, it is not easy to prove this. It is pointed out how women victims of structural violence (do not) fit into the provisions of international public law when they have to prove that they are threatened with persecution, serious human rights violations or serious physical injuries in their country of origin. Apart from the difficulties in proving and accepting the existence of gender-based violence, the trend of introducing migration restrictions is becoming more and more intense globally, which makes the situation even worse for women.

MORE AND MORE RESTRICTIONS

The already existing *de iure* and *de facto* obstacles are being followed up by the tightening of the reception of refugees in many destination states. Authorities around the world have tightened border controls, making it difficult for large parts of the global population to legally enter or stay in their states. Most European states are politically facing strong right-wing resistance regarding migration. Cuts in foreign aid by the US and European states are affecting refugee camps around the world, while the number of displaced people remains near record levels. According to the United Nations, about 122 million people are displaced worldwide (Martin, 2025, July 11). In response to high demand for public reception infrastructure, states continue to tighten asylum legislation. Some of the main destination states have also begun imposing restrictions on other legal migration pathways to curb immigration and ease pressure on the housing market and on public services. (OECD, 2024: 10-11)

Merciless immigration systems usually aim to mechanically differentiate refugees as people who have fled war violence from the so-called economic migrants who cannot count on asylum or other easier and more likely ways of legalizing their stay in Europe. In the case of women, this misunderstanding leads to not recognizing or ignoring the essential female migratory specificity, namely that they fled from gender-based violence, usually no less deadly than wartime violence which makes them refugees rather than economic migrants, as they are usually treated (Mršević & Janković, 2018). Restrictive regulation and such a process itself often lead women to even greater illegality, forcing them into an even more vulnerable position, increasing their need for “middlemen” who abuse them for the purpose of trafficking, e.g. sexual exploitation and forced labor (Mršević, 2016).



The EU's new hardline immigration policy could lead to cuts in development funding unless African states stop migrants from leaving. Under the Global Europe instrument, the distribution of aid can now depend on how well a country cooperates on return, readmission and border control. The pressure is particularly intense in states like Germany, Italy and Greece, where national governments face growing domestic opposition to asylum seekers. Policy experts and researchers across Africa have condemned the policy change, calling it coercive and neo-colonial. "Stop your people from migrating or you will lose aid", is the message of the governments of European states to the states of Africa emphasizing their determination to limit the reception of migrants. This reduces African states to the frontiersmen of Europe while ignoring the fact that poverty and political instability force many Africans to risk their lives in search of places where they can live. That is why closing doors or building (literal, physical, but also in the form of legal-political barriers) walls are not considered by many to be a just solution (Mefo Newuh, 2025, July 22).

The European Union is currently taking steps to regulate the reception of migrants, with a focus on balancing humanitarian access and managing migration pressures. New rules within the "Pact on Migration and Asylum"⁴ (Politika, 2024, April 4), include strengthened controls at external borders, accelerated procedures for asylum and return of migrants, as well as mechanisms for a more even distribution of responsibilities among member states. States such as Germany, France, and Denmark are reintroducing internal border controls due to the increased number of migrants passing through EU routes (Riegert, 2024).

Despite criticism from the High Commissioner for Refugees, the Greek Ombudsman, the Union of Administrative Judges and numerous non-governmental human rights organizations, a law was adopted in Greece (Politika, 2025, September 3) which provides for the forced return to the states of origin of rejected asylum seekers and criminalizes illegal stay in the country, which is now punishable by a prison sentence of two to five years.

Germany is suspending financial support for non-governmental organizations that rescue migrants in the Mediterranean Sea and elsewhere. The federal government no longer plans to subsidize NGOs that rescue migrants in the Mediterranean, which is one of the deadliest migration routes in the world, especially now because of Germany's tightening policy on migrants. Of the 21 non-governmental organizations that participate in the rescue fleet in the Mediterranean Sea, ten are German, and they claim that in the past ten years they have saved more than 175,000 migrants. This dramatic decision will certainly worsen the humanitarian crisis in the Mediterranean. Measures were also announced to limit the reception of asylum seekers and deport most of them from the land borders (Politika, 2025, June 25).

Local policy changes, such as state declarations that they will not process claims, threats of deportation, border controls, or public hostility toward refugees within a potential country of destination, can discourage people, especially those displaced by violence and persecution, from seeking asylum (Agius, 2025, April 10). The fight against illegal immigration remains an important issue in Germany in 2025, where the related issues of domestic security and extremism are dominant. How to fight against illegal immigration while encouraging skilled immigration is the current challenge for Germany. At the same time, the question arises as to how the country should deal with the apparent rise of populism and far-right extremism, especially in a situation where many local authorities in Germany claim to have reached their financial limits when it comes to receiving and caring for refugees, while facing tremendous pressure from the far-right (Thurau, 2024, December 30).

4 The Pact on Migration and Asylum is a comprehensive European response to migration that establishes new, fair and effective rules for managing migration flows within the EU. Adopted in April 2024, the pact introduces a permanent framework of solidarity among member states, easing pressure on the most affected countries and ensuring a fair sharing of responsibilities. The goal is to ensure faster procedures for granting asylum, strengthening external borders and cooperation with third countries, while guaranteeing the human rights of migrants.



In Poland, helping refugees is even treated as a criminal offense, as in the case of the so-called “Hajnovska five”, who in March 2022 provided emergency aid to an Iraqi-Kurdish family with seven children and thus, according to the prosecution, deliberately “resisted the current migration policy” and destabilized security on the eastern border of Poland (Wojcik, 2025).

In this context of ever-present restrictions, the opportunities for migrant women to be granted asylum in destination states are also decreasing.

Table 2: *Comparative table of state practices — migrant women and asylum*

Country	Recognition of Gender-Based Persecution in Practice	Gender-Sensitive Procedures (e.g., female interviewers, private consultations)	Safe/Special Reception Spaces and Services (GBV protection, health, and psycho-social support)	Access to Free Legal Aid & Procedure Duration	Main Implementation Barriers / Problems
Germany	Gender-based grounds formally recognized, but practice inconsistent across centers; some forms (e.g., FGM) recognized in judicial practice.	Guidelines exist, and some centers use female interviewers; practice varies by state.	GBV victim protection programs exist in reception centers, but the safety and reintegration of returnees remain problematic.	Legal representation and access to aid are available, but long durations and transfers (Dublin) hinder continuity.	Inconsistent implementation across centers; perpetrators sometimes returned to shared spaces; victims sometimes discouraged from reporting violence.
Sweden	Formally, high standards and guidelines recognizing gender aspects; legislation and practice strive to be gender-sensitive.	Migration agency implements private consultations and offers female officers/interpreters; access varies during emergency arrival waves.	Focus on safe spaces and specialized GBV services, though resource pressures and proposals to limit legal aid raise concerns.	Legal aid exists; some limitations have been discussed recently; appeal periods are standard but can be long.	Pressures on the system during large inflows; potential restrictions on legal aid and risk of reduced support quality.
United Kingdom	Guidelines exist (Home Office) on gender issues; recognition of GBV as a basis for asylum, but practice is often criticized.	Guidelines require support and information, but investigations/interviews are criticized as re-traumatizing; women often request female interviewers.	Services and NGO support exist; issues with mixed accommodation and safety in centers.	Legal aid is formally available (limitations depend on the case); a high number of appeals and claims slow down the process.	Reports indicate re-traumatization, lack of trust in the system, and legislative changes discouraging reporting of sexual violence.

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France	Recognizes gender aspects in asylum procedures; some cities have developed special reception spaces for female victims.	Separate protocols and training in larger centers; practice varies, and high rates of post-arrival sexual violence are noted.	Specialized capacities introduced (e.g., 300 places for victims in one initiative); health and psycho-social services available via state and NGO programs.	Legal aid and access to services exist, but victims often do not seek help due to shame or lack of awareness.	High rates of post-arrival sexual violence; reporting is hampered by culture, fear, and lack of trust.
Serbia	The national asylum system formally follows international standards; GBV cases are recognized, but practical challenges exist.	Protocols and initiatives for private interviews and protection exist, but training and resources are not always sufficient.	UN and NGO programs (safe rooms, psycho-social support) are active, especially via UNICEF/UNHCR projects, but coverage is incomplete.	Legal aid is available via UNHCR partners and legal services, but capacity is limited and procedures sometimes lengthy.	Lack of continuous state structure for GBV in reception centers; variable availability of safe spaces and psycho-social support.
Greece	Gender risk assessments conducted; UNHCR actively runs GBV programs; recognition of gender-based grounds often depends on individual cases and system capacity.	Private interviews and GBV training are implemented in larger centers; practice varies, especially at border and transit points.	UNHCR and NGO GBV programs (safe spaces, psycho-social support) exist, but coverage is limited in camps and during high influxes.	Legal aid via UNHCR/NGO partners; procedures can be slow due to high caseload and push-back practices at borders.	Main problems: limited camp resources, push-backs/restricted access to procedures at borders, re-traumatization during interviews.
Turkey	Large refugee population; system formally includes protection; UNHCR and partners work on capacity-building for GBV, but challenges due to the scale and the legal framework differing from that of EU states.	Training programs and projects for women's empowerment (education, interpreters, specialized services), but implementation and availability vary by region.	Specialized services (centers, psycho-social support) are available via state and international partners, but local coverage is uneven.	Legal aid and protection processes are partially available; high inflows strain capacity and may delay procedures.	Main problems: population size and logistical challenges, regional differences in service availability, and difficulties in identifying and monitoring GBV victims.

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Malta	Efforts to integrate gender needs in asylum procedures (AIDA/EUAA reports), but small state size and migration management create practical challenges.	Protocols and some gender-sensitive interview programs exist; NGOs and IOM/UN projects (e.g., PROTECT) work on SGBV prevention and response.	State centers and NGO services provide health and psycho-social support, but concerns remain over treatment in detention and insufficient protection.	Legal aid formally exists, but limited capacity and detention complicate continuous support; procedures are sometimes slow.	Main problems: risk of degrading treatment in detention, limited service capacity during influxes, and insufficient victim awareness.
Hungary	Recognition of individual gender-based claims is hindered by a strict national migration policy; AIDA reports note the lack of clear SGBV mechanisms in centers.	Limited formal procedures for SGBV detection; practice depends on individual officers; closed transit regimes further restrict access.	Specialized assistance is limited in centers and transit zones; NGO access is hindered by legal restrictions.	Access to legal aid is formally restricted in practice (especially during restrictive measures); appeals and procedure access may be blocked outside the territory.	Main problems: strict state policies (closed transit zones), legal obstacles to submitting claims within the territory, and ECJ rulings on rights violations.
Croatia	Formal recognition of gender aspects exists; AIDA and other reports note GBV risks during transit and issues with police procedures (pushbacks, abuse).	Protocols and capacities in larger centers exist, but GBV victim identification and referral are often not systematically implemented.	UN/NGO programs (safe rooms, psycho-social support) are active, especially in border zones; the frequency of pushbacks and incidents compromises safety.	Legal aid is available via NGO/legal networks, but capacity and destruction of evidence (e.g., phones) hinder GBV cases and evidence in proceedings.	Main problems: reported pushbacks and border violence (destruction of evidence, trauma), lack of consistent identification of SGBV victims.
Bosnia and Herzegovina (B&H)	The system theoretically prioritizes vulnerable groups; however, the UN and partners report frequent GBV cases and limited response capacity.	Protocols for identifying vulnerable persons and projects for private interviews exist, but implementation varies and often depends on international organizations.	–	–	–

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North Macedonia	Legal framework allows recognition of gender-based persecution, but such cases are rarely recognized in practice; the system often focuses on transit migration.	Protocols for identifying vulnerable persons and training for officials exist, but implementation depends on the availability of interpreters and trained interview teams.			

ORIGINALITY/VALUE

The paper focuses on the correlation between the issue of the urgently needed demographic renewal of Europe and the issue of realizing the dignity of all migrants at the international level. In order to optimize immigration policy, European countries should strengthen social integration measures in order to maximize the economic contribution of immigrants, while at the same time alleviating increased social frictions. Immigration and the health of migrants are becoming key elements of European economic growth. The reception of migrants alleviates the problems associated with the accelerated aging of the population in the developed countries of the West. In addition to fiscal benefits, immigration contributes to innovation and enrichment of the labor market. Employers recognize the value of diversity in the workforce, while the integration of immigrants into the education system and the labor market increases overall productivity and reduces social frictions.

The connection between migration and demography

The importance of reviewing demographic renewal strategies in Europe, as well as linking migration with sustainable economic development in regions that send migrants, as the best way to reduce migratory pressures, was the topic of this year's OSCE Summit on Demography and Migration, held on April 2, 2025 (IFIMES, 2025, April 2).

The population of the European Union reached a record 450.4 million people in 2024, only not because of birth rates but thanks to migration after the COVID-19 pandemic. In the course of 2024, the EU gained 1.07 million new inhabitants, with a positive migration balance of 2.3 million people offset by a natural depopulation of 1.3 million.

In order to alleviate labor shortages and respond to demographic challenges, Italy has decided to issue more than half a million work visas, which can only be obtained by non-EU workers (Forbes, 2025, July 1). Italy plans to legally receive almost half a million workers from outside the EU by 2028 (EUpravoZato, 2025, July 16). Spanish Prime Minister Pedro Sánchez often describes his country's migration policy as a means to combat low birth rates. Spain remains largely open to migrants, al-



though other European countries seek to tighten controls at their borders to prevent illegal crossings and deter asylum seekers. Spain requires approximately 250,000 registered foreign workers annually for its social protection system to remain sustainable. Accepting refugees also offers additional benefits, including cultural enrichment, a higher level of respect for human rights, and prosperity for all (Politika, 2024, November 20).

Europe offers better conditions for newcomers than any other rich region of the world, which explains why, despite the current slow economic growth, it will continue to be a major destination for migrants. The OECD study indicates that the effect of migration depends on the integration of immigrants into the labor market. In general, immigrants contribute more in taxes and contributions than governments spend on their social welfare, health, and education (Nikolić, 2025).

Angela Merkel's 2015 speech, known as "We Will Succeed"⁵ was a motivational and collective call to overcome the challenges posed by migration (Shelton & Ford, 2025). Key messages from the speech included a promise that the EU and Germany would together "succeed" in overcoming the migration problem and emphasizing the importance of cooperation and solidarity in Europe. More than a decade after Merkel's "We Will Succeed", trying to encourage the citizens to receive millions of refugees, their willingness to receive asylum seekers has significantly declined today. After incidents, including murders and terrorist attacks, and the emergence of misogyny, homophobia, and anti-Semitism among asylum seekers, German citizens are becoming increasingly skeptical. Nevertheless, Germany's politics and economy still believe that they will successfully respond to the challenges brought by new waves of refugees and the changing social climate (Rujević, 2025).

Taking into account demographic trends, economic challenges, and migration potential, it is clear that migration is a key element of Europe's sustainable development. In this context, the role of women is, among other things, to promote dialogue and build trust within these political and economic relations (Mršević & Janković, 2021: 36).

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CRIMINALISTIC AND CRIMINOLOGICAL CHARACTERISTICS OF POLICE CORRUPTION IN THE REPUBLIC OF NORTH MACEDONIA

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ABSTRACT

Purpose: The purpose of this paper is the analysis of the criminological and criminalistic characteristics of police corruption in the Republic of North Macedonia, regarded as a distinct form of corrupt conduct perpetrated by employees within the Ministry of Internal Affairs. Through a theoretical examination, the research analyses the conceptual definition of police corruption and researches the criminalistic characteristics of the crimes committed by employees within the organizational structures of the Ministry. The criminological characteristics include research through the scope, structure and dynamics of criminal acts committed during the research period (2020–2024), alongside an exploration of the attitudes and perceptions of a part of police employees regarding the issue of corruption within their ranks. The indicators obtained from the study will be the basis for drawing conclusions and making recommendations for combatting this problem.

Design/Methods/Approach: The paper consists of several units: Definition of police corruption; Criminological characteristics of police corruption – scope, structure, and dynamics of crimes; Criminalistic characteristics of police corruption; Analysis of research conducted with employees within police structures; Conclusions and Recommendations. The research employs normative, statistical, and comparative methods, while the primary research instrument consists of a survey administered to employees within the police structures.

Findings: The results obtained from the conducted research are analysed in order to gain insights into this issue, based on which recommendations have been formulated for the prevention and suppression of police corruption in the Republic of North Macedonia.

Originality/Value: This paper is original and constitutes a theoretical analysis of the research problem, presenting the results of independently conducted empirical research for the purposes of the study. It employs scientific methods and data collection instruments for data gathering, analysis, and comparison, and introduces a research instrument, a survey of police personnel aimed at obtaining insights into the attitudes and perceptions of employees within police structures regarding corruption within their ranks.

Keywords: police corruption, police officers, criminological characteristics, criminalistic characteristics

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INTRODUCTION

Corruption is widely recognised as one of the most serious security risks worldwide. It remains a pervasive and structural problem, deeply embedded in social systems, particularly within governmental and administrative structures. Despite repeated warnings to policymakers, “it is not enough to point to the rate of corruption in underdeveloped countries, because the understanding of corruption does not always reflect the reality or severity of the current level of corruption in a country”. The issue becomes especially critical when corruption evolves into a normalised social practice, as examining public perceptions of corruption alone does not necessarily reveal the true nature or the emerging forms of corrupt behaviour (Madichie, 2005).

The employees of the Ministry of Internal Affairs of the Republic of North Macedonia (RNM) include those who hold the status of authorised officials for performing professional works and police officers. They are obliged, in the performance of their duties and tasks, to protect and safeguard the lives and property of citizens, to respect the freedoms and rights of citizens and to apply only those measures and means of coercion prescribed by law or other regulations. In their work, they must adhere to the principles of legality; proportionality and fairness; management regarding the effectiveness of employees; professional ethics, impartiality, and objectivity; transparency and confidentiality; accountability; prevention of conflicts of interest; and economical use of resources (Law on Internal Affairs, Official Gazette of RNM No. 60/25). All police personnel hold the status of officials as defined in the Criminal Code of RNM, Art. 122, par. 4, p. a) (Official Gazette of RM No. 37/96...248/18).

Police corruption is a socially harmful phenomenon of serious concern, as it constitutes criminal behaviour that occurs and persists within the ranks of authorised officials performing professional duties and police officers holding official status who are expected to uphold the Constitution, laws, subordinate regulations and established principles. Such acts involve the active non-application of legal and regulatory provisions or the passive failure to enforce laws, while simultaneously fulfilling the elements of various corruption-related criminal offenses, as well as other crimes committed through the abuse of laws or “trading in influence”.

Police personnel engage in criminal activities through active acts of corruption, acquiring unlawful financial gain, either individually or as part of organized criminal groups. They also act as perpetrators of offenses where the law specifies that criminal acts are committed within the scope of official duties



(e.g., harassment in the performance of duties, sexual offenses through abuse of position, etc.). Other criminal acts that fall under police corruption include offenses in which perpetrators present themselves as police officials or officers with the intent to mislead victims and obtain unlawful financial gain, such as fraud. “Trading in influence” is a method of police corruption in which police officers, while committing criminal acts, use their official status to influence colleagues to avoid detection or to affect the process of securing or failing to secure evidence.

Although corruption is commonly identified with bribery or the abuse of official position, there exists a significant number of other criminal offenses that can be committed through corrupt practices (i.e., offenses that inherently involve the concept of corruption, defined as the misuse of conferred authority for private purposes and gain). This implies that the commission of such offenses does not automatically constitute corruption in itself; rather, it depends on the offender’s position, the manner of execution, the motive, the resulting harm, and other relevant factors (Davitkovski et al., 2021). Police corruption is directly influenced by the status and position of employees within police structures, while the method of execution is linked to their police competencies and authorities, and the motive in the majority of cases is the acquisition of unlawful financial gain.

Corruption within the police represents the abuse of police powers and authority, ranging from routine unethical behaviour by officers to serious forms of illegal conduct through which they obtain illicit benefits or misuse their authority to conceal crimes or facilitate other criminal activities. To detect and address police corruption, a comprehensive system of legal measures and institutional controls must be established to identify, investigate, and sanction such criminal behaviour. Several factors hinder the effective control of corruption, including the reluctance of officers to report corrupt activities among their peers (commonly referred to as the “Code of Silence” or “Blue Curtain”), the unwillingness of police leadership to acknowledge the existence of corruption within their ranks, the benefits derived from typical corrupt transactions by the involved parties, and the absence of immediate victims willing to report corrupt practices (Gjurčinovska, 2022).

The study analyses criminal offenses committed by employees within all organizational structures of the police, based on cases investigated by the Department for Internal Control, Criminal Investigations and Professional Standards, which operates within the Ministry of Internal Affairs of the RNM and is responsible for overseeing the legality of the work of police officers and other personnel within the ministry’s structures. Corruption-related criminal offenses are those committed by police employees who engage in criminal conduct within the scope of their official duties. According to the Criminal Code (Official Gazette of RM No. 37/96 ... 248/18 and Official Gazette of RNM No. 188/23), these offenses are codified in Chapter 30. In addition to crimes against official duty, other crimes committed by employees of police structures and related to their police powers are also covered, or these are crimes committed through “trading in influence”.

An analysis was conducted on the scope, structure, and dynamics of criminal offenses committed by employees within police structures during the period 2020–2024, as well as an analysis of a survey examining the attitudes and perceptions of police employees regarding corrupt practices within their ranks. Based on these analyses, conclusions were drawn and recommendations were formulated for the prevention and suppression of police corruption.

POLICE CORRUPTION

Police corruption is a specific form of corruption that manifests through the abuse of police powers and authority and occurs in multiple forms. This includes the active commission of criminal offenses



with elements of corruption, as well as the failure or omission of police officers to act in situations where they are required to detect, investigate and secure evidence for crimes prosecuted *ex officio*. The problem is particularly sensitive in the context of the border police, who, through inaction, fail to control vehicles and passengers despite having the legal authority and mandate, thereby enabling the unimpeded transport of drugs, weapons or other prohibited goods, as well as the unauthorized crossing of migrants.

Additionally, unlawful actions by officials performing professional duties, particularly in the issuance of personal documents and the maintenance of police records, constitute significant concerns. Abuses in the issuance of personal documents such as providing documents with false information or under a stolen identity represent especially serious criminal behaviour, as they facilitate subsequent criminal activities. For example, issuing an identity card in someone else's name allows the perpetrator to withdraw money from the account of the person whose identity has been stolen, using their personal data without authorisation.

According to Kesić, police corruption as a criminal phenomenon can be defined from two perspectives. The narrower approach, or conventional definition, views police corruption as the abuse of police authority (powers, position) for the purpose of obtaining personal gain, typically through bribery. The broader approach defines police corruption as the abuse of police authority in general (Kesić, 2012). Later, Kesić further categorises police corruption into four groups: petty corruption (accepting small gifts); bureaucratic corruption (illegal issuance of documents); criminal corruption (extorting regular payments from criminal groups); and political corruption (disclosing confidential information to politicians) (Kesić, 2017).

Defining police corruption is a significant challenge, given the wide range of behaviours and forms it can take, occurring in numerous situations and across diverse cultural contexts. From a pragmatic perspective, it is therefore preferable to adopt a broader definition that encompasses criminal acts (Newburn, 1999). According to Prenzler, the police, in terms of both organizational structure and police subculture, are highly susceptible to corruption, which manifests in numerous opportunities and challenges, generating internal deviations within police structures. Corruption within their ranks also tends to adapt and evolve over time (Prenzler, 2009).

Police corruption can manifest in several forms, including: corruption for the purpose of obtaining material gain — accepting bribes in exchange for performing lawful duties; opportunistic thefts (theft by individuals under police protection); extortion (accepting bribes in exchange for neglecting the detection and securing of evidence for a criminal offense); “fixing” situations (destroying traces or objects related to a criminal offense); the active commission of a criminal offense (a police officer committing a crime to obtain unlawful financial gain); and concealment or manipulation (destroying or planting evidence and objects related to a criminal offense, most commonly in cases of illicit drug production or trafficking) (Kralj, 2014).

The most suitable definition for this study is the one adopted by the Geneva Centre for the Democratic Control of Armed Forces (DCAF) in the development of the *Police Integrity Handbook* in 2012, as provided by the Interpol Expert Group on Anti-Corruption (IEGAC). According to this detailed definition of police corruption, specific manifestations and forms of the phenomenon are identified (DCAF, 2012):

- The solicitation or acceptance, whether direct or indirect, by a police officer or any employee within a police force/service, of any amount of money, valuable item, gift, service, promise, reward, or advantage — either for themselves or for any other person, group, or entity — in exchange for any action or inaction that has occurred, is occurring, or may occur in the future,



and which relates to or is connected with the performance of any police function or police-related activity.

- The offering or giving, whether direct or indirect, to a police officer or any employee within a police force/service, of any amount of money, valuable item, gift, service, promise, reward, or advantage — either for themselves or for any other person, group, or entity — in exchange for any action or inaction that has occurred, is occurring, or may occur in the future, and which relates to or is connected with the performance of any police function or police-related activity.
- Any action or inaction in the context of the dismissal or removal of a police officer or any other employee within a police force/service that may improperly result in the initiation of a criminal charge or conviction against any person, or that may improperly contribute to a situation in which a criminal charge is not filed or a person is released from criminal liability.
- The unauthorized disclosure of confidential information or police-restricted information in exchange for a reward or for any other purpose.
- Any omission in the process of dismissal or release from duty by a police officer or any other employee within a police force/service for the purpose of obtaining money, valuable items, gifts, services, promises, rewards, or advantages — either for themselves or for any other person, group, or entity.
- Any action or inaction related to corruption, as defined by the law of the member state.
- Participation as a principal perpetrator, co-perpetrator, initiator, instigator, accomplice, aider before or after the commission of a criminal offense, or as a conspirator, or in any other role in the commission or attempt to commit any offense.

Some of the formulations regarding the manifestations of police corruption have been incorporated into the criminalization of corruption-related offenses in the Macedonian Criminal Code (Official Gazette of RNM No. 248/18), particularly concerning the acceptance of bribes and the acceptance of gifts.

The very nature of the policing profession provides opportunities for involvement in corrupt practices that would otherwise be unavailable to individuals (Johnson, 2008). Police corruption represents a distinct form of corruption, occurring within police structures responsible for legal and professional duties, the issuance of personal documents to citizens, maintaining public order and safety at border crossings, and, importantly, detecting, investigating and providing evidence for criminal activity while apprehending offenders. In such cases, officers may serve criminal interests by exploiting their legal powers and authorities for illicit purposes. Police corruption places the judiciary in conflict with its presumed primary ally in the enforcement of justice. Although corrupt officers constitute a small percentage of sworn personnel, corruption remains a serious issue that must be addressed to maintain police morale and preserve public trust in law enforcement (EBSCO Research Starters, n.d., <https://www.ebsco.com/research-starters/law/police-corruption>).

Police officers are also susceptible to exploiting their official position and powers for “trading in influence” and committing other criminal acts to obtain illicit financial gain. In some cases, certain behaviours, though technically minor, are normalized and accepted within the environment, allowing officers to accrue both wealth and power. This creates a climate of fear among citizens, discouraging them from reporting both minor misconduct and more serious offenses involving criminal acts.

CRIMINOLOGICAL CHARACTERISTICS OF POLICE CORRUPTION

The causes of abuse or corruption within the police are influenced by both the structural organization of police institutions and their position within society (e.g., nepotism, bureaucracy, unavoidable contact with criminal networks, the impossibility of exercising absolute control over all officers, etc.), as



well as by the specificities of police subculture (e.g., the “wall of silence”). This is further compounded by an underdeveloped level of professionalism, where police solidarity predominates. The police are characterized by a high degree of group loyalty and identification, which, while generally beneficial for effective law enforcement, can also facilitate elements of police corruption. Authorised officials performing professional duties and police officers who refrain from acting against their corrupt colleagues due to loyalty often become victims themselves and may be at risk of becoming involved in corrupt schemes (DCAF, 2012).

In the Republic of North Macedonia, in 2021, a criminal case of police corruption was detected and prosecuted, involving authorised officials performing professional duties. Specifically, ten authorised officials in the Ministry of Internal Affairs, working in positions responsible for issuing passports and other personal documents, organised, motivated and instigated by an external individual, produced and issued over 200 passports using stolen identities between 2017 and 2021. These passports were issued to individuals who had not resided in the country for an extended period or had not applied for personal documents. The forged passports contained photographs of well-known Balkan and international criminals, while personal data were stolen from Macedonian citizens. The authorised officials entered these stolen data into the computer system and issued fraudulent documents, obtaining illicit financial gain and enabling the holders to cross borders legally. Some of these individuals were internationally wanted, including the leader of the notorious Škaljari clan, Jovan Vukotić, whose mafia, together with the Kavač clan, controls drug trafficking in the Balkans. A forged passport issued through legal procedures with a stolen identity was also obtained by the leader of the Turkish mafia, Sedat Peker (<https://plusinfo.mk/skandal-mvr-izdalo-legalni-pasoshi-na-balkanski-narko-bosovi-so-ukradeni-identiteti-od-zhivi-makedonci/>, accessed 14. 09. 2025). The case was investigated under the code name “Dvojniki” (Eng. “double”, “look-alike”). A total of 11 perpetrators were reported to the Macedonian Public Prosecutor’s Office, ten of whom held the status of official employees, suspected of committing the criminal offense of “Abuse of Official Position and Authority” under Article 353, and one individual was charged with incitement under the Criminal Code (Official Gazette of RNM No. 248/18). Regarding the method of execution, 215 passports were issued under stolen Macedonian identities with photographs of the individuals requesting the passports, utilising identities of citizens living abroad. Additionally, four passports were issued illegally by using multiple personal identification numbers assigned to one individual, which had not been cancelled, in order to create new identities that were then combined with photographs of applicants to issue new fraudulent passports (<https://jorm.gov.mk/za-11-licza-povedena-postapka-za-zloupotrebi-pri-izdava%D1%9Aeto-pasoshi/>, accessed 15. 09. 2025). Following the filed indictments, criminal proceedings were opened, in which seven of the accused pleaded guilty, resulting in one suspended sentence and six prison sentences for the issuance of 215 passports to foreign nationals wanted on international warrants. Six of the convicted were the Ministry of Internal Affairs employees, found guilty of abusing their official positions and authority, while one other individual was convicted as an intermediary for incitement. Those who did not plead guilty were subsequently sentenced to prison. In total, ten Ministry of Internal Affairs employees were convicted for abusing their official positions and authority in the illegal issuance of passports to foreign nationals (<https://novamakedonija.com.mk/makedonija/hronika/>, accessed 15. 09. 2025).

Scope, Structure and Dynamics of crimes committed by employees within the organisational structures of the Ministry of Internal Affairs of the RNM

The data presented in the table are drawn from the Annual Reports of the Ministry of Internal Affairs, which encompass the Department for Internal Control, Criminal Investigations and Professional



Standards, and pertain to reported criminal offenses committed by police officers and other employees within the organisational structures, including the administrative staff. The data cover the research period from 2020 to 2024.

Table 1: *Volume, structure and dynamics of criminal acts*

Criminal offense/ Article	2020	2021	2022	2023	2024	Total
Serious bodily injury - 131	/	/	/	1	/	1
Harassment in performance of the duty -143	5	3	4	3	3	18
Endangering security - 144	/	/	/	/	1	1
Violation of the rights of an employment relationship –166	/	/	/	/	1	1
Adultery by abusing the position – 189	/	/	/	/	1	1
Killing and torturing animals - 233	/	/	/	/	1	1
Theft of electricity, heat or natural gas – 235 - a	/	/	/	/	1	1
Robbery - 237	/	/	1	/	/	1
Evasion - 239	/	/	/	1	/	1
Fraud - 247	/	/	/	/	1	1
Causing general danger - 288	/	1	1	/	4	6
Abuse of official position and authority - 353	7	10	5	3	9	34
Negligent performance of the duty - 353 - v	/	4	1	1	9	15
Duty embezzlement - 354	/	/	1	1	/	2
Fraud in the duty - 355	/	/	/	/	1	1
Taking duty advantages - 356	/	1	/	/	/	1
Accepting bribes - 357	/	1	5	4	3	13
Falsification of official document - 361	/	1	2	/	1	4
Helping to the perpetrator of the omitted criminal act - 365	/	/	/	/	1	1
False reporting of a crime 366	/	/	1	/	/	1
Special cases of falsification of documents - 379	/	/	/	./	1	1
Obstructing an official from performing an official action - 382	/	/	/	/	1	1
Removal or destruction of an official seal or document – 390	/	/	/	/	1	1
Unauthorized production, possession, brokering and trading of explosive weapons Substances - 396	/	/	/	/	1	1
Total criminal acts	12	21	21	14	41	109



Based on the data provided by the Ministry of Internal Affairs of the RNM from the Annual Reports on the work of the Department for Internal Control, Criminal Investigations and Professional Standards for 2020 (Report, 2020), 2021 (Report, 2021), 2022 (Report, 2022), 2023 (Report, 2023), and 2024 (Report, 2024) (<https://portal.mdt.gov.mk/module-block-documents/76-document-mk.pdf>), a total of 109 criminal offenses committed by police officers and other employees within the organizational structures were identified during the 2020–2024 research period. Of these, 84 were corruption-related offenses involving elements of abuse of official duty, while 25 offenses were committed by employees in police structures and were related to “trading in influence” or other criminal acts assumed to go undetected.

In terms of the structure of offenses, the most prevalent was Abuse of official position and authority - 353, with 34 cases (31.2%), the majority of which were identified and reported in 2021. This includes the criminal case investigated under the code name “Dvojniki”, which involved the issuance of passports to foreign criminals using stolen identities. Another notable category was the offense of Harassment in the performance of the duties - 143, with 18 cases, indicating inhumane and improper behaviour by police officers exercising their authority in ways that enabled harassment. Other crimes include Negligent performance of the duty - 353-v, with 15 cases and Accepting bribes - 357 with 13 cases.

The data presented clearly indicate the presence of corruption within the police; however, they do not fully reflect the actual situation, as only a small portion of incidents are formally reported.

CRIMINALISTIC CHARACTERISTICS OF POLICE CORRUPTION

The criminalistic characteristics of corruption-related offenses determine the specificity of combating this type of crime both on a scientific-theoretical and practical level, according to the different types of criminal acts. They define the directions and fundamental theoretical premises, as well as the criminalistic methods for detecting, proving, clarifying and preventing these types of offenses (Angeleski, 2018).

Criminalistic characteristics are essential in the classification of specific criminal offenses, particularly in linking the *modus, tempus, instrumentum operandi* system of commission to the motives of the perpetrators and their status as authorised police officers or other employees holding official positions. All criminalistic characteristics play a crucial role in the full detection, clarification and collection of evidence for committed criminal offenses of corruption, as well as in determining the status of the perpetrator and whether the act is directly or indirectly related to their official duties and powers.

A fundamental criminalistic characteristic is the criminal situation itself, which involves answering the question: what occurred? Does the case involve unethical behaviour by an employee within the police structures, a disciplinary violation, or does it encompass the elements of a specific criminal offense? The *modus operandi* is closely tied to the official status and legal authority of the perpetrators. Therefore, it is highly important to clarify the method of commission to determine the nature of the offense whether it constitutes a corruption-related crime or another criminal act committed by a police employee using “trading in influence” or assuming that the act would remain unreported, undetected and unpunished.

In the process of clarifying criminal offenses, the status of the employee is determined according to their employment decision and the inventory of duties and tasks in order to establish which law has been violated, the manner of execution, and whether the criminal act was committed during official working hours (assigned schedule) or outside working hours, but still related to criminal activities connected with the official position. Bribery can also occur outside of working hours and premises, but its purpose remains the execution or non-execution of legally prescribed measures and actions.



The question “What happened?” encompasses a broader scope than the legal qualification of the offense. Its significance lies in determining the unlawful elements of a specific corruption-related or other criminal act, whether it was committed intentionally or negligently, which criminal actions were undertaken by the suspect and during which period, and whether there are mitigating or aggravating circumstances. It also helps establish whether the act was motivated by personal gain or involved improper conduct in the exercise of police powers (Korajlić et al., 2020).

From the perspective of the means of execution in corruption-related offenses with elements of abuse of official powers and the use of force exceeding authority or involving harassment, it is essential to determine which means were employed — whether police coercive measures or physical force causing injury. In corruption-related offenses involving unlawful acquisition of property, it is important to identify the type and amount of illicit gain, particularly in cases of bribery (type and amount of financial benefit), while in cases of abuse of official position and authority, the illicit gain obtained by the suspect police officers or by others must be determined, including type and value.

For a comprehensive clarification of the criminal situation, all circumstances must be reconstructed with evidentiary material following the system: CRIMINAL OFFENSE – EVIDENCE – PERPETRATOR – VALUE OR DAMAGE.

ANALYSIS OF EMPIRICAL RESEARCH CONDUCTED THROUGH A SURVEY OF POLICE OFFICERS

For the purposes of this study and to gain insights into police corruption in the Republic of North Macedonia, research was conducted through a survey of police officers. The survey employed a pre-structured questionnaire comprising 27 questions, to which 22 police officers from various organisational units of the Ministry of Internal Affairs provided their responses.

The structure of the survey questions included a general section, addressing the respondents' level of education (primary, secondary, higher education, master's, and doctoral degrees). Among the respondents, 68.2 % held higher education degrees, 22.7 % held master's degrees, and the remaining 9.1 % had other educational qualifications. The gender distribution was evenly split at 50 % each. Regarding age, 45.5 % were between 46 and 55 years old, 36.4 % were between 36 and 45 years old, and the remaining respondents were over 18 years of age. In terms of work experience, 59.1 % had more than 20 years of service, 27.3 % had 11–20 years of experience, and 13.6 % had less than 10 years. The respondents' positions included uniformed officers, police officers in managerial roles, and officers from other organisational units. Regarding geographic distribution, 54.5 % of the respondents were police officers from Skopje, while 45.5% were from other cities across the country.

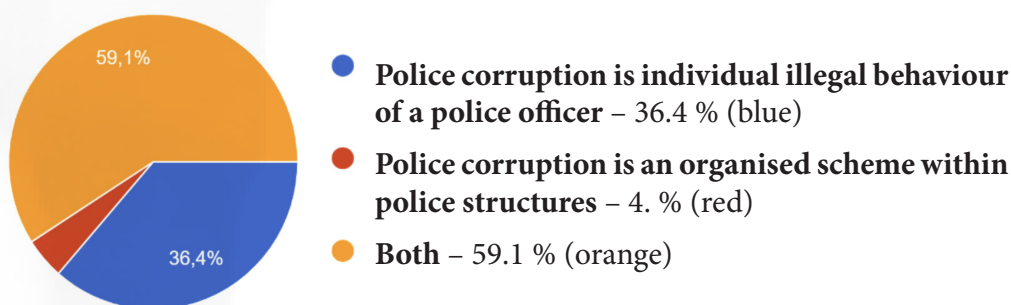
Based on the provided data, the responses of the surveyed police officers provide valuable insights into the nature and prevalence of police corruption within their ranks. Questions 7 through 27 focused on the respondents' attitudes, experiences, and reflections regarding the issue of police corruption. Regarding the question of whether police corruption is considered a major problem in the country, 81.8 % of respondents answered affirmatively, while 9.1 % believed it is not a significant problem and another 9.1 % were uncertain. Furthermore, 86.4 % of respondents reported being familiar with the concept of police corruption, 4.5 % were unaware of the phenomenon and 9.1 % remained neutral or unsure. When asked about the severity of the problem, 28.9 % considered it extremely serious, 53 % regarded it as serious and the remaining 18.1 % did not perceive it as serious or did not have a definitive opinion. Regarding solidarity among police officers and whether they had witnessed corrupt behaviour among colleagues, 81.8 % responded negatively, while 18.2 % indicated that they had observed such behaviour.



In response to the question, “Which police officers are in the most favourable position to engage in corruption?”, the answers indicated that uniformed intervention police responsible for public order and safety, as well as traffic police, were most frequently cited, each accounting for 31.8 % of responses. Additionally, 18.2 % identified ministerial assistants, while another 18.2 % considered officers from other managerial structures, administrative units and criminal investigation departments to be more susceptible. Regarding the reasons for engaging in corrupt behaviour, 45.5 % of respondents cited financial gain and access to other benefits. An equal proportion, 45.5 %, indicated low salaries and the need to supplement family income as a motivating factor. A smaller number highlighted assisting others in committing crimes or infiltrating criminal groups as contributing factors.

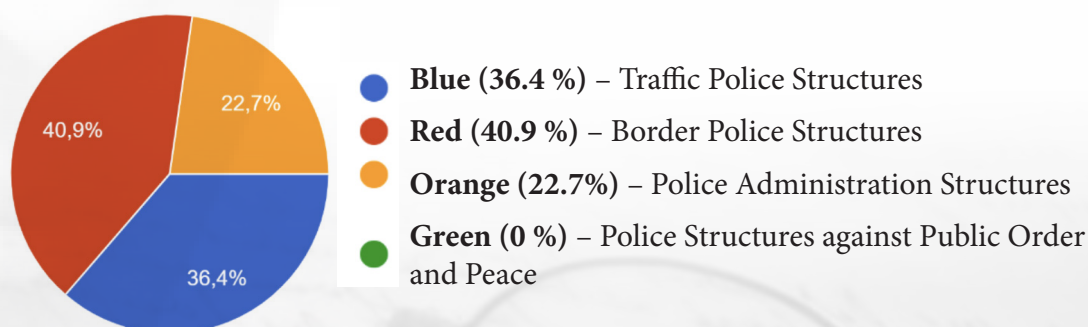
Responses to Question 13 are illustrated in Graph 1, showing that 4.5 % of respondents believed police corruption results from organised criminal groups, whereas the majority, 59.1 %, considered it a combination of individual acts and offenses committed by organised groups within the police. Meanwhile, 36.4 % perceived police corruption as primarily the result of isolated unlawful conduct by individual officers.

For more specific questions, we present the structure of the answers graphically. Namely, for the question: *What do you think: is police corruption an individual behaviour of a police officer or is it part of an organised scheme within police structures?*



Graph 1

To the question: *In your opinion, where are the organised schemes of police corruption most prevalent?*



Graph 2

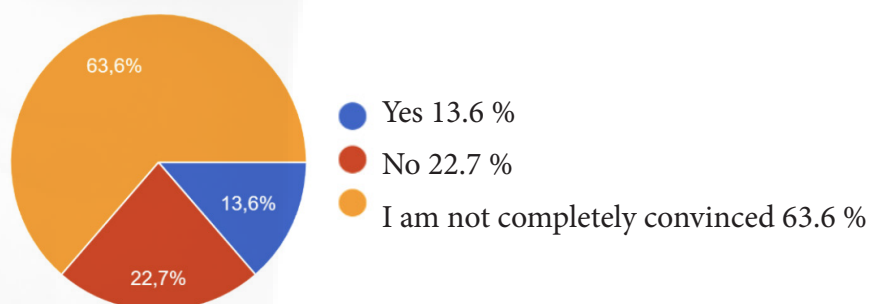
When asked whether they had witnessed corrupt behaviour, only 22.7 % of respondents confirmed having done so, while the remainder either denied it or declined to answer. Regarding the types of corrupt practices observed, respondents indicated that corruption is not limited to abuse of official duty (27.3 %) or accepting bribes (27.3 %), but also includes other criminal offenses committed by police officers (45.4 %).

Regarding the question on the manifestations of corruption specific criminal offenses 27.3% of respondents each identified “accepting bribes” and “abuse of official duty and authority”, while 40.9 %



considered that other criminal offenses are also involved. When asked whether they had ever been offered a bribe, 86.4 % responded negatively. Meanwhile, 90.9 % of respondents believed that police corruption primarily involves soliciting bribes, whereas 9.1 % indicated it involves soliciting services, reflecting the property-motivated nature of the perpetrators, although the provision of services can also have a material dimension. A total of 86.4 % of respondents consider police corruption to be a serious problem that requires prevention. They identified low salaries, insufficient institutional oversight, impunity, and unethical behaviour as the primary factors contributing to police corruption.

To the Question: *According to you, do the police have an established system for combating corruption within their own ranks – police corruption?*



Graph 3

The final set of questions addressed the prevention of police corruption. According to the respondents, effective measures include frequent inspections (59.1%), media campaigns promoting “Report Corruption” (54.5 %), anonymous reporting mechanisms (63.6 %), preventive repression through the successful prosecution of each case (68.2 %) and the efficiency of the established system for combating police corruption within the Ministry of Internal Affairs (36.4%). The majority of respondents believe that education and training of police officers represent a fundamental prerequisite for combating police corruption. Regarding sanctions, 63.6 % consider immediate suspension from duty necessary, while the remainder believe that, in addition to suspension, criminal charges should be filed for offenses in accordance with the law.

CONCLUSIONS AND RECOMMENDATIONS

Based on the theoretical examination of definitions, manifestations and forms of police corruption, it can be concluded that:

- Police corruption is a distinct form of corruption that manifests in multiple forms and expressions and is always closely linked to the status and professional position of employees within police structures.
- Police officers are structured as authorised officials performing professional duties and as uniformed police officers.
- From Macedonian practice, a serious case of police corruption involves an organised criminal scheme for issuing forged passports to international criminals. In this scheme, over 200 passports were produced through legal procedures using identity theft or misuse of personal identification numbers. For the committed crimes, 10 individuals from the Macedonian police were investigated, charged and convicted for “Abuse of Official Position and Authority”, and one person outside the police structures was charged for instigation.



- According to the analysis of reported criminal offenses during the studied period, most cases involve corruption-related crimes with elements of abuse of official duty. However, there are also reports of other criminal offenses in which “trading in influence” was used, or police solidarity was leveraged during the commission of the acts.
- From the survey conducted among police officers, it is evident that they are aware of what constitutes police corruption. However, when asked whether they have personally been offered a bribe, most responses were negative. As for preventing police corruption, the respondents emphasised the importance of increased education and training for officers on handling corrupt practices. They also highlighted the need for more serious sanctions for offenders, beyond mere termination of employment, including the initiation of criminal proceedings.

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THE CRIMINAL OFFENCE OF “QUACKERY” IN THE MACEDONIAN LEGISLATION AND PRACTICE

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ABSTRACT

Purpose: The paper shall focus on one of the criminal offences within Chapter 21 of the Macedonian Criminal Code, i.e., the criminal offence titled “Quackery” (in Macedonian language *Надриликарство*). Although its object of protection is human health, it can be noted that not enough attention is given to this criminal offence by practice and scientific thought. In essence, the quackery is performed by a person who, without the prescribed qualification, deals in treatment or in providing medical assistance.

Design/Methods/Approach: The paper shall pay attention to the relevant literature, legal acts, statistical data, and court practice. Concerning the legal acts, the focus shall be on the Criminal Code, but at the same time the other legal acts addressing the issue of human health shall not be neglected. Furthermore, a comparative analysis of the legislation of other countries shall be conducted as well. In addition, the paper shall provide scientific analysis and description of the statistical data available to the Macedonian authorities and shall elaborate on specific cases in which quackery was established.

Findings: From the references used, the paper shall make an effort to determine why the quackery is not receiving enough attention in the literature. By analyzing the Macedonian Criminal Code as well as the other legislation, the important characteristics of this criminal offence shall be determined, and at the same time, through the comparative analysis, it shall be possible to compare how quackery is regulated in other countries. Furthermore, the review of cases in which quackery was established shall allow us to acknowledge the ways of its performance in practice, including what type of sentences have been imposed on the convicted persons.

Originality/Value: The paper shall try to emphasize that human health is an extremely important object of protection, it is an area in which there should be no improvisations allowed to be performed by unqualified persons, and there must be strict rules about who can engage in treatment or provide medical assistance. All of this implies that the relevant Macedonian stakeholders must take a more serious approach when it comes to quackery.

Keywords: quackery, Criminal Code, human health, Republic of Macedonia.

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Katerina Krstevska Savovska has finished law studies, has defended her master’s thesis titled “The legal limitations of the police powers in relation to the protection of the human rights and freedom”, and has defended her doctoral dissertation titled “The role of the European Committee for the Prevention of Torture in protecting persons detained by the Police”, at the Faculty of Law “Justinianus Primus” – Skopje within the University “Ss. Cyril and Methodius” – Skopje. She has worked in the Macedonian Ministry of Internal Affairs and Ministry of Finance, and she is currently working as a full professor

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INTRODUCTION

The prevalence of quackery in the healthcare system is a serious challenge worldwide. This issue has long been a top concern for medical professionals throughout history, as mentioned in Hippocrates' famous oath and his ethical writings on law and honesty (Amir-Azodi, Setayesh, Bazayr, Ansari, & Yazdi-Feyzabadi, 2024: 10). Despite the ethical and legal principles that must be respected by the person who practices medicine, the criminal offence titled “Quackery” (in Macedonian language *Надриликарство*) is not just defined in the Macedonian Criminal Code within Chapter 21, but also several judgments relating to it can be noted in the court practice. Nevertheless, at the very beginning it must be pointed out that the number of criminal charges filed, indictments raised, and judgements delivered for the period 2010–2024 is extremely low, even though it is a criminal offence that can, among other things, cause serious consequences not only to the human body and health, but also death.

ANALYSIS OF THE CRIMINAL-LEGAL FRAMEWORK

The Macedonian Constitution (1991, 1992, 1998, 2001, 2003, 2005, 2009, 2011, 2019) contains a separate section regarding the economic, social, and cultural rights, among which is Article 39 that guarantees the right to healthcare to every citizen (Paragraph 1), as well as that the citizens have the right and duty to protect and promote their own health and the health of others (Paragraph 2). Human health is further protected by several offences in the scope of the so-called medical law, especially by the Law on Health Protection (2012, 2013, 2014, 2015, 2016, 2019, 2021, 2022, 2023, 2024) and the Law on Protection of the Rights of Patients (2008, 2009, 2011, 2015, 2019). The Law on Health Protection strictly stipulates that the health services can be provided by health workers, with a note that certain tasks in the health sector may also be performed by health associates who meet the requirements of this law. In addition, “healthcare worker” is defined as a person who provides health services in the implementation of a certain health activity and is registered in the register of healthcare workers (doctor of medicine, doctor of dentistry, and pharmacist with completed higher education or with completed academic integrated studies with 300, i.e., 360 ECTS in the field of medicine, dentistry, and pharmacy, healthcare workers with completed higher or higher vocational education or with 180 ECTS in the field of medicine, dentistry, and pharmacy) and healthcare workers with completed secondary education. On the other hand, “healthcare associate” is defined as a person with higher education who independently performs certain tasks in the healthcare sector in cooperation with healthcare workers. All of these workers and associates should provide quality healthcare towards the patients, i.e., measures and activities that, in accordance with the modern achievements of medical, dental, and pharmaceutical science and practice, as well as by their knowledge and skills, shall increase the possibilities for the most favorable outcome of treatment and reduce the risks of adverse consequences for the health and health status of the individual and the community as a whole. In the same line is the Law on Protection of the Rights of Patients, which uses the same definition for the term “patient” (a person, sick or healthy, who requests or is undergoing a certain medical intervention for the purpose



of preserving and promoting health, preventing diseases and other health conditions, treatment, or healthcare and rehabilitation), as well as defines the “medical intervention” as any examination, treatment, or other activity with a preventive, diagnostic, therapeutic, or rehabilitation purpose undertaken by an authorized health worker.

Furthermore, human health is the main object of protection of the criminal offences defined in Articles 205–217 of Chapter 21 of the Criminal Code (CC) (1996, 1999, 2002, 2003, 2004, 2005, 2006, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2017, 2018, 2023). Kambovski and Tupancevski (2011: 238) note the criminal-law protection of human health differs from the protection of this good within the classical framework of criminal offences against life and body. The basic characteristic of the indictments in this area is that they are generally dangerous offences, offences against the health of many people, an undefined circle of people, and not just against the health of an individual. Among these criminal offences, the offence titled “Quackery” is also included, and it is performed by a person who, without the prescribed qualification, deals in treatment or in providing medical assistance. In addition, Đorđević (2009: 150) categorizes this offence within the group of criminal offences that endanger people’s health through treatment and medication. As notable from the used wording in the Macedonian CC, Article 209 is composed only by one paragraph, that regulates what is meant under Quackery. If such wording is being analyzed, then the following characteristics can be noted about the offence that is often called a “quasi-medical criminal offence”:

- *Perpetrator*: The offence is a *delicta communia*, indicating that a quack can be any person, i.e., the offence can be performed by anyone who does not have the prescribed professional training/qualification. In connection with the perpetrator, according to Randelović (2019: 242), a question can be raised whether a doctor who provides treatment for which he does not have an appropriate specialization, for example, a general practitioner who performs an operation or a gynecological examination or a childbirth, can also be considered as a perpetrator of this criminal offence? In the literature, it is considered that in such a case there is no criminal offence of quackery, but it should be considered that there is a criminal offence of negligent provision of medical assistance, because for a person who has a general professional qualification, the assumption that he will perform the treatment or provide other medical services in an unprofessional manner cannot be valid, so such a person should not be considered as a quack doctor even though he lacks a certain narrower specialization.
- *Object of protection*: Human health, body, and life.
- *Object to which the action of execution is directed*: Towards the human body and health.
- *Way of execution*: A person deals in treatment or in providing medical assistance. Additionally, CC uses the conjunction “or” between the two ways of execution of this offence. The first way is “deals in treatment” (the quack acts like a doctor), and the second way is “deals in providing medical assistance” (the quack takes actions that are performed by other healthcare professionals).
- *Duration*: The used word “deals” in the CC’s deposition (in Macedonian language *се занимава*) implies that the person has been “dealing”, i.e., has been involved in such activities for a long period of time. It can be perceived as the person having been “dealing” in such activities as if they were his profession, for which he did not have prescribed professional training. The quack deals in, i.e., performs such actions for a long time, and therefore his determination to perform these actions should be considered.
- *Subjective aspect*: The quack is a perpetrator who deals with intent when committing this offence, indicating that he knowingly acts like a doctor or a healthcare professional.
- *Benefit from the committed offence*: The benefit is irrelevant, the only requirement for the existence of this offence is that its perpetrator was dealing in treatment or in providing medical assistance. Hence, the quack can be dealing for reward or without reward, but this is not important, and

therefore the free quack's services should also be prosecuted. Although the motive of the quack can be financial, the gained benefit is not a legally relevant element for the offence to exist.

- *Consequence*: Quackery exists regardless of whether the harmful consequence has occurred, the only thing that is important is to deal in treatment or to provide medical assistance without the prescribed qualification. Therefore, Vuković (2024: 326), observes that the legislator did not make this offence consequential, which means that the offence is formally completed by repeatedly undertaking some of the actions, regardless of whether any harmful consequences have occurred. Nevertheless, Article 217, "Severe criminal offences against the health of people", prescribes aggravated sentences in two cases, i.e., because of the quackery a person has been severely bodily injured, or his health has been severely damaged (Paragraph 1), and if one or more persons have died (Paragraph 2). In addition, whether the treatment or the medical assistance provided was successful or unsuccessful is also irrelevant. Therefore, Milovanović (2022: 228) points out that when committing the criminal offence, the consequence can be both abstract and concrete. Namely, an abstract danger is a possibility for the occurrence of a concrete danger, and it occurs in the case when a person without appropriate professional training acts contrary to the CC, but in the specific case there was no damage to the health of another person, while, on the other hand, there is a concrete danger in the case when the health of another person is damaged as a consequence of the committed criminal offence.
- *Punishment*: The quack shall be punished with imprisonment of up to one year and with a fine. Moreover, if a person has been severely bodily injured or his health has been severely damaged – then the quack shall be punished with imprisonment of one to ten years (Article 217 Paragraph 1), and if one or more persons have died – then the quack shall be punished with imprisonment of at least four years (Article 217 Paragraph 2, in 2014 the prescribed imprisonment was increased from "at least three years" to "at least four years").

Concerning Article 276 of the new Draft CC (Draft CC; published in July 2022 on the Unique National Electronic Register of Regulations – "ENER"), the wording used in the disposition is the same as Article 209, but there are some differences in the prescribed sentences (ENER, 2022). Namely, the Draft CC uses the conjunction "or" instead of "and" between the two sentences, which means that the fine as sentence can be imposed as a main sentence (not like the present CC – only as a secondary sentence to the main prison sentence). In addition, the fine in the draft CC is firstly listed as a sentence, followed by the imprisonment of up to one year.

When it comes to comparative analysis, the criminal codes of the *Federation of Bosnia and Herzegovina* and of *Montenegro* are stipulating similar dispositions for the offence of quackery as the Macedonian CC, however there is a difference in the prescribed sentence – imprisonment of up to one year and a fine (Bosnian CC, Article 233 *Nadriliječništvo*) (2003, 2004, 2005, 2010, 2011, 2014, 2016, 2017, 2023), i.e., a fine or imprisonment of up to two years (Montenegrin CC, Article 293 *Nadriljekarstvo*) (2003, 2004, 2006, 2008, 2010, 2011, 2013, 2015, 2017, 2018, 2020). It is interesting to note that the *Serbian* CC (2005, 2009, 2012, 2013, 2014, 2016, 2019, 2024) in Article 254 criminalizes not only quackery as an offence that is performed by a person who, without an appropriate professional qualification, deals in treatment or in rendering other medical services (Paragraph 1 – *Nadrilekarstvo*), but also criminalizes the practice of fraudulent pharmaceutical activities, i.e., the perpetrator deals in preparing or dispensing medicaments (Paragraph 2 – *Nadriapotekarstvo*). The sentence prescribed for both paragraphs is the same – a fine or imprisonment of up to three years. *Croatian* CC (2011, 2012, 2015, 2017, 2018, 2019, 2021, 2022, 2023, 2024) differs from the previously mentioned codes because it provides the basic disposition of the offence of quackery (Article 184 *Nadriliječništvo*), but at the same time it unites several qualifying situations. When it comes to the basic form of quackery, Paragraph 1 prescribes that only imprisonment of up to one year can be imposed as a sentence on the



perpetrator, which means that contrary to all other codes – the perpetrator cannot be sanctioned with a fine. The next paragraphs regulate the aggravated situations of the offence, i.e., it has caused a serious bodily injury or considerable deterioration of the illness (Paragraph 2, imprisonment of six months to five years), particularly severe bodily injury or pregnancy termination (Paragraph 3, imprisonment of one to ten years), or death of one or more persons (Paragraph 4, imprisonment of three to fifteen years). Finally, the Croatian CC stipulates one more paragraph (Paragraph 5), according to which the means used for the treatment shall be confiscated. The same as the previous code, CC of *Slovenia* (2008, 2009, 2011, 2012, 2015, 2016, 2017, 2020, 2021, 2022, 2023, 2024) contains provisions regarding the quackery (Article 180 *Mazaštvo*), with a note that for its basic form imprisonment of six months to five years is prescribed. However, such a basic form (the perpetrator deals in treatment or performs medical services despite the lack of the required qualification) is expanded with a remark that by doing so, the perpetrator is discouraging the patient from seeking medical help in a timely manner (Paragraph 1). In addition to this, if such a perpetrator causes serious damage to the health of a person who did not consent to or was unable to consent to medical procedures, then he shall be sentenced to imprisonment of six months to eight years (Paragraph 2), or if the death of a patient has resulted, then he shall be sentenced to imprisonment of one to ten years (Paragraph 3). Like the Croatian CC, the Slovenian CC notes that the means that were intended for or used in treatment pursuant to Paragraph 1 shall be confiscated.

ANALYSIS OF THE AVAILABLE STATISTICAL DATA

Concerning the data disposable to the Macedonian State Statistical Office (n.d.), it can be noted that its annual reports of the perpetrators of criminal offences published on the official webpage do not contain information about the offence of quackery. Therefore, requests for access to public information were sent to the Ministry of Internal Affairs, Public Prosecutor's Office, and Supreme Court. The Ministry of Internal Affairs was asked to provide data about reported offences of quackery in the period 2010–2024, to which the Ministry replied (2025) that in the given period, eight perpetrators have been reported for committing such offences:

- 2011 in Skopje (one criminal offence with one reported perpetrator),
- 2018 in Gevgelija (one criminal offence with one reported perpetrator),
- 2019 in Skopje (one criminal offence with one reported perpetrator),
- 2020 in Negotino (one criminal offence with one reported perpetrator),
- 2021 in Skopje and Bitola (two criminal offences with one reported perpetrator for each offence),
- 2022 in Struga (one criminal offence with one reported perpetrator),
- 2023 in Gostivar (one criminal offence with one reported perpetrator).

In addition, a request for access to public information was submitted to the Public Prosecutor's Office, by which it was asked to provide information about the number of criminal reports received and the number of indictments filed for all 22 Basic Prosecution Offices for the period 2010–2024. Contrary to the Ministry that provided the requested data, the Public Prosecutor's Office (2025) on 03.06.2025 answered, “We are not able to provide the requested information, because the Public Prosecutor's Office does not process such data, i.e., the requested information is not information that already exists and is available to the Public Prosecutor's Office”. Consequently, the abovementioned request was sent to all 22 Basic Prosecution Offices (Berovo, Bitola, Veles, Gevgelija, Gostivar, Debar, Delčevo, Kavadarci, Kičevo, Kočani, Kriva Palanka, Kumanovo, Ohrid, Prilep, Radoviš, Resen, Sveti Nikole, Skopje, Struga, Strumica, Tetovo, and Štip), and the following information was provided:



- Basic Prosecution Office – Gostivar (2025): in 2023 one criminal report was received, based on which an indictment proposal was filed. Afterwards, the Court of First Instance – Gostivar delivered a judgement of conviction and sentenced the accused person to alternative measure probation – imprisonment of 1 year (suspended for 3 years);
- Basic Prosecution Office – Prilep (2025): in 2021 one criminal report against one person was received, but it was dismissed with a decision;
- Basic Prosecution Office – Kavadarci (2025):
 - in 2012 one criminal report against one person was received, but it was dismissed with a decision,
 - in 2018, one criminal report against one person was received, which was processed under Article 43 of the Law on Criminal Procedure (conditional postponement of the criminal prosecution), and afterwards a decision was adopted not to initiate a criminal prosecution,
 - in 2020, one criminal report against one person was received, for which a motion for issuing a penal warrant was filed to the Court of First Instance – Kavadarci. The accused person was found guilty and sentenced to a probation – imprisonment of 3 months (suspended for 1 year), as well as a fine as an additional punishment.
- Basic Prosecution Office – tip (2025): in 2021 two criminal reports against two persons were received, based on which motions for issuing penal warrants were filed to the Court of First Instance – Štip. The accused persons were found guilty and sentenced to alternative measure probation – imprisonment and a fine.

The other offices replied that they haven't received criminal reports for the offence of quackery (Bero-vo, Bitola, Gevgelija, Debar, Delčevo, Kičevo, Kriva Palanka, Ohrid, Radoviš, Resen, Sveti Nikole, Struga, and Tetovo), but also there were offices that did not reply at all (Veles, Kočani, Kumanovo, Skopje, and Strumica).

Finally, a request for access to public information was sent to the Macedonian Supreme Court, asking for information about the number of delivered judgements for the offence of quackery in the period 2010–2024, as well as about the types of delivered judgements – rejection, acquittal, and conviction. Instead of providing the requested information, the Supreme Court (2025) referred to a link on its website. Therefore, a separate request was sent to all 24 Courts of First Instance (Bero-vo, Bitola, Veles, Vinica, Gevgelija, Gostivar, Debar, Delčevo, Kavadarci, Kičevo, Kočani, Kratovo, Kriva Palanka, Kruševo, Kumanovo, Negotino, Ohrid, Prilep, Radoviš, Resen, Sveti Nikole, Skopje, Struga, Strumica, Tetovo, and Štip), and five of them informed us that six judgments have been delivered so far:

- Court of First Instance – Bitola (2025): in 2018 one acquittal judgement was delivered, however – the judgement that was provided was for a wrong criminal offence (about the offence shysterism, i.e., false attorney, in Macedonian language *Надпунуцапсво*, Judgement K. No. 233/18 of 12/01/2018);
- Court of First Instance – Gevgelija (2025): in 2018 one judgment of issuing a penal warrant was delivered by which an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) was imposed;
- Court of First Instance – Kavadarci (2025): in 2020 one judgment of issuing a penal warrant was delivered by which an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) was imposed, as well as a fine of 12300 Denars (200 Euros);
- Criminal Court of First Instance – Skopje (2025): in 2014 one judgment based on a guilty plea was delivered by which an alternative measure of probation – imprisonment of 9 months (suspended for 2 years) was imposed, as well as a fine of 27675 Denars (400 Euros);
- Court of First Instance – Štip (2025):



- in 2021 one judgment of issuing a penal warrant was delivered by which an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) was imposed, as well as a fine of 9225 Denars (150 Euros);
- in 2022 one judgment of issuing a penal warrant was delivered by which an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) was imposed, as well as a fine of 12300 Denars (200 Euros).

Except for the Court of First Instance – Berovo (did not respond to the request), the remaining courts replied that there were no judgments about the criminal offence of quackery. However, on the Supreme Court’s portal a judgment based on a guilty plea delivered in 2023 by the Court of First Instance – Gostivar (2023) can be found, by which an alternative measure of probation – imprisonment of 1 year (suspended for 3 years) was imposed and a fine (no data provided). In addition, the Court evicted the perpetrator since he was not a Macedonian citizen.

Taking into account the data available to the relevant institutions (State Statistical Office, Ministry of Internal Affairs, Basic Prosecution Offices, and Courts of First Instance), it can be concluded that the institutions do not record the statistics properly, and concerning the offence of quackery, no general findings can be drawn.

MACEDONIAN JURISPRUDENCE

As mentioned before, Judgment K. No. 113/18 issuing a penal warrant was delivered on 17/08/2018 by the Court of First Instance – Gevgelija (2018), and an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) was imposed on the accused person, M.G. (female, Macedonian citizen, pensioner, unconvicted, no proceedings were being conducted for another criminal offence), because she committed the criminal offence of quackery. Namely, in the period from May 2016 to April 2018, she provided medical assistance by performing examinations and determining diopters for several people so they could use glasses with diopters. She performed these actions without having prescribed professional training in accordance with the Law on Health Protection, i.e., her certificate for passing a professional and theoretical exam in the field of binocular correction issued by the Institute “O.” was not nostrified in the Republic of Macedonia, and she had no license issued in the Republic of Macedonia for performing eye examinations for the purpose of determining diopters. Also, she was sentenced to a fine of 6150 Denars (100 Euros).

In the second case, the Court of First Instance – Kavadarci (2020) on 21/12/2020 by Judgement K. No. 301/20 decided that the accused person, Z.G. (male, Macedonian citizen, employed, married, with completed secondary education), committed the offence of quackery because in the period from 2015 till 18/10/2019, in his own home, taking advantage of the same opportunities, and with the intention to obtain unlawful gain for himself, he engaged in treatment without prescribed professional training from a competent state body (Ministry of Health). He provided medical assistance by selling medicines for several human diseases (such as cancer, bacteria, tumors, back pain, and other diseases) in the form of liquids packaged in small bottles with the inscription “PRK 74”, as well as in the form of creams packaged in plastic boxes of different weights and substances. The “medicines” that he made (ethyl alcohol was their basic substance) were promoted through business cards with the inscription of his name and surname, where he falsely added the title “molecular biologist” for various types of diseases, as well as with his phone number, and labels and stickers with different content intended for the plastic boxes and creams that he sold with different prices to people throughout the entire country. Having in mind the above, the Court delivered a judgment of issuing a penal warrant and imposed an



alternative measure of probation – imprisonment of 3 months (suspended for 1 year), as well as a fine of 12300 Denars (200 Euros).

The Judgement K. No. 178/14 based on a guilty plea was delivered on 02/07/2014 by the Criminal Court of First Instance – Skopje (2014), by which an alternative measure of probation – imprisonment of 9 months (suspended for 2 years) and a fine of 27675 Denars (400 Euros), were imposed on the accused person, P.T. (male, Macedonian citizen, unemployed, completed secondary education, student at the Faculty of Medicine, completed an eight-month course on physical therapy at the University “K.R.”, married, father of a minor, unconvicted, no proceedings were being conducted for another criminal offence). In the period from October 2012 to April 22, 2013, at the Rehabilitation and Relaxation Center “S.M.”, without any prescribed professional training, he was engaged in treatment and in providing medical assistance in a way that, although he did not have a degree from the Faculty of Medicine, he performed physical therapy, massage, and examinations, attended matches and training sessions as a doctor and physiotherapist and performed medical examinations for individuals and sports clubs. A main, public and oral hearing was scheduled for 02/07/2014, and upon the Court’s call for the accused person to state his position regarding the criminal offence, whether he feels guilty or not, the accused person voluntarily pleaded guilty to the criminal offence of quackery. He admitted that he had committed the offence and at the same time stated that he is now aware that what he did was illegal and that he is trying to put things in order (to finish his studies, and until he receives his diploma, he will not engage in that activity), and at the same time he expressed remorse.

The Court of First Instance – Štip (2021, 2022) delivered two judgments regarding the criminal offence of quackery. The first Judgment K. No. 379/21 of issuing a penal warrant was delivered on 08/11/2021 towards the accused person (male, Macedonian citizen). Without prescribed professional training, in the period of 2020, he was engaged in treatment – providing medical assistance in such a way that in October 2020 to M.A. for the treatment of psoriasis, and in November 2020 to T.M. for the treatment of decubitus, for the amount of 400 denars each, he sold 0.5 liters of liquid (ethyl alcohol with a concentration of 33% and boric inorganic acid that is widely used in medicine). The Court found the accused person guilty of the criminal offence of quackery and imposed an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) and a fine of 9225 Denars (150 Euros).

The same as the judgement in 2021, the second Judgment K. No. 20/22 of 21/01/2022, was delivered by the Court, and a penal warrant was issued, by which an alternative measure of probation – imprisonment of 3 months (suspended for 1 year) was imposed, as well as a fine of 12300 Denars (200 Euros). The accused person (female, Macedonian citizen), in the period from January to April 2021 in her home, provided medical assistance to S.C. and I.C. by giving them medicines for several diseases such as diabetes, hair loss, and coronavirus. The medicines were packaged in glass bottles with different inscriptions and were sold to S.C. and I.C. for different prices. By these actions, the accused person committed the criminal offence of quackery, since she engaged in treatment without prescribed professional training from a competent state body (Ministry of Health) and with an intention to obtain unlawful gain for herself.

Finally, the Court of First Instance – Gostivar (2023) on 09.06.2023 delivered Judgement K. No. 324/23 based on a guilty plea of the accused person M.Č. (male, citizen of T., employed in a private entity, completed higher education, married), and sentenced him to an alternative measure of probation – imprisonment of 1 year (suspended for 3 years), together with a fine (no data provided). Also, since the perpetrator was not a Macedonian citizen, and because of the circumstances under which the offence was performed, the nature of the offence, and the motives of the perpetrator, which suggested undesirability of his future stay in the country, the Court based on the CC’s Article 38-d evicted the perpetrator with a note that such sentence will last for 5 years from the day of his eviction from the



territory of the Republic of Macedonia, and will be executed by the Ministry of Internal Affairs. In essence, the accused person (no data provided about the period), in the village V. in a business premises with the inscription “E.B.” in a house owned by M.M., provided health services without having the prescribed professional training in accordance with the Law on Health Protection and without a license issued by a competent authority. He performed such activities through Facebook and by phone, scheduled appointments, and performed examinations of sick people. Afterwards, by using bioenergy as well as various herbal medicines (prepared by himself), he prescribed them therapy. For these services, he had a price list based on which he charged the patients.

CONCLUSION

Even though the main object of protection of the criminal offence of quackery is human health, it can be concluded that in the observed period from 2010 to 2024, there is an extremely low number of criminal reports, indictments, and judgments. In addition to this, the statistics are not recorded properly. As for the delivered judgments, it can be noted that all convicted perpetrators have been sentenced to an alternative measure of probation – imprisonment and a fine. Concerning the CC’s disposition, similar wording is used by the other criminal codes that were a subject of comparative analysis. Despite all these observations, the offence of quackery must receive adequate attention in the future from the relevant authorities, because it is a criminal offence that is committed by a perpetrator as an occupation but without the prescribed qualification, and for the provided so-called “health services”, the perpetrator often charges his/her patients. Finally, the relevant authorities must pay attention to who is dealing in treatment or in providing medical assistance on the Macedonian territory and whether these persons meet the strict conditions defined in the legal acts, because contrary to this – such “quasi-medical” workers can harm not only a concrete individual, but also they represent a threat to the entire healthcare system.

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THE “KLIMT AFFAIR” AND THE CHALLENGES OF COMPLEX CULTURAL HERITAGE PROTECTION

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ABSTRACT

Purpose: This study examines the shortcomings of the current system of cultural heritage protection in Hungary, based on the analysis of the “Klimt case”, which hit the international press in the spring of 2025, with the aim of exploring the interrelationship between the protection of a state's own cultural heritage and the security of the country. The authors make recommendations to inspire a more effective management of the challenges identified, highlighting the need for a systemic approach to the problem as outlined above. By analysing the “Klimt case”, they highlight the sensitive nature of the ownership and export of works of art as an area of cultural heritage protection.

Design/Method/Approach: The study focuses on Gustav Klimt's “The African Prince”, an unknown work from Hungary, which was released onto the international market, where it took only one year to be exhibited at TEFAF (The European Fine Art Foundation) art fair in Maastricht in March 2025 as Gustav Klimt's portrait of a West African prince. The painting was subsequently offered for sale by the Viennese art dealer Wienerroither & Kohlbacher for €15 million. The paper uses both general and specific scientific methods and procedures of logical conclusion, statistical, as well as a positivist legal method. The manner of research includes the selection and application of scientific methods, the selection of data and the scope of research.

Findings: The background to this is that the Hungarian authorities allowed the “unknown painting” to be delivered without recognising the significance of the painting and the “Gustav Klimt Nachlass” stamp on it, and without taking into account the results of the identification and examination of the artwork by the Painting Research Laboratory that verified the authenticity of the painting. The laboratory carries out scientific research and documentation of paintings. The case is par excellence contrary to the Hungarian Heritage Protection Act (Act LXIV of 2001), which states that all works of art older than 50 years are subject to an export permit, and in the case of outstanding cultural value, the authorities may refuse to grant a permanent export permit. The painting clearly fell into this category, but the painting examination file was not attached, which highlights the anomalies arising from its incompleteness.

Originality/Value: Going further, the Klimt case is not only noteworthy from a heritage protection perspective, but also from a restitution perspective, as it highlights the problematic nature of Hungarian restitution practice and the possibility of circumventing the system.

Keywords: painting analysis, heritage protection, system theory, Gustav Klimt's African Prince

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INTRODUCTION

“A painting is a symbolic commodity, on the one hand a luxury item, on the other hand a means of preserving value or speculative investment [...] What distinguishes it from other products is that it is typically the result of original and predominantly creative work.” (Kertész, 2018: 66)

The art market and the sale and purchase of cultural assets play an important role in the preservation and dissemination of culture. However, works of art not only represent aesthetic and cultural value, but also serve as investment opportunities.² The market price of artworks is influenced by their authenticity, history, condition, and demand, but valuation still involves subjective elements and it is difficult to determine their value accurately,³ which means that the art trade has become a breeding

² One of the greatest attractions of artwork is that it represents a very high value, even in monetary terms, and thus retains its value. In most cases, therefore, the motivation behind thefts committed to order is not some kind of eccentric collector's passion, but simply the effective investment of wealth acquired by other illegal means, or investment in an object that arouses the least suspicion and is usually highly mobile, easy to transport, i.e., it can be taken away and sold if necessary. Its stable value makes it a prime target during the times of financial crisis (Virág, 2012).

³ The assessment of brushwork, for example, does not provide complete certainty in determining the author of a painting, especially if the painting in question has been poorly restored several times. Over the years, inappropriate paints that have “settled” on the surface, as well as improper storage and handling, all leave their mark on the surface of the painting, slowly



ground for abuse, forgery, fraud, and illegal trade.⁴ According to Dossi (2008), there is no other market where the value of goods is surrounded by such uncertainty as the painting market.

However, the mainstream media and society are less concerned with this phenomenon, as illegal art trafficking appears in the social communication space mostly as a curiosity, a crime committed by a specific social group, and therefore it is perceived by the public as a factor posing an insignificant threat to society as a whole and to public safety in general, even though the value of these objects is significant, both materially and ideologically.

“Few people know that a large proportion of art thefts (approximately half in Hungary) consists of opportunistic thefts, and even fewer are aware that illegal art trafficking is the third most profitable branch of the black market (after drug and illegal arms trafficking)⁵ and is most often intertwined with other forms of organized crime. For these reasons, effective action against the illegal trade in works of art can greatly contribute not only to the protection of our irreplaceable cultural heritage, but also to the effectiveness of crime prevention and law enforcement in a broader sense”⁶ (Virág, 2012).

THE AIM AND RESEARCH METHODOLOGY

The illegal trade in works of art is typically an international phenomenon par excellence, and it is also difficult to detect.

Money laundering in the art and antiques market can be implemented in several ways, but there are some main methods. Art in the function of economic destruction, especially in the field of money laundering, is most often manifested in two ways:

- When money laundering is criminalised on the basis of all criminal offenses as predictive criminal offenses using the art market that offers instruments, techniques, goods and services that enable the legalization of criminal proceeds.
- When money laundering is criminalised solely on the basis of criminal offenses that have been manifested in recent times, which concern the unauthorized appropriation of counterfeiting and trafficking in stolen works of art and antiques.

Various investors, including those from the criminogenic milieu, are panicking for alternative forms of investing illegal income, trying to get money from stocks and real estate whose value has dropped in recent years. It is this fast-growing industry that is constantly looking for new methods and techniques

becoming an integral part of the artwork. The traces of decades become one with the image, and the original work of art slowly disappears from view.

4 What determines the value and price of a painting? Teszárik – Váradi (2020) compiled a list of factors that influence the value and price of a painting (based on the works of Gáspárdy (2014), Kertész (2018), Martos (2011), and Muldowney (2015). Accordingly, the factors influencing value and price are: the painter's name, fame, reputation, where the painter comes from (local value and national taste), the size of the painter's oeuvre (how many paintings he or she has painted and how rare a given painting is), the period of the painter's creative career to which the painting belongs, when it was created, the painting's reputation, the painter's reputation, the painting's technique, size, level of detail and condition, the painting's authenticity, originality, historical background, art-historical and aesthetic value, the history of the painting (who has owned it so far, how long it has been on the market), the painting's previous appearances in collections and exhibitions, the reputation of the gallery representing the painter, social trends (what others are buying), where the painting is sold (domestically or abroad, in a renowned gallery or not).

5 Private collections are the primary targets of art thieves. Source: http://artportal.hu/aktualis/hirek/a_mukincstolvajok_elsodleges_celpontjai_a_magangyujtemenyek (Downloaded on: 01. 08. 2012.)

6 Virág (2012) supports his own findings in his referenced study with a brief overview of the topic and also discusses how current events in international affairs may influence the operation and development of the international black market in works of art.



of money laundering acquired in a dishonourable way. It is for these reasons that the state’s policy on art crime must have a multidisciplinary basis.” (Čudan & Major, 2024)

The aim of this study is to highlight new types of challenges, solutions, and untapped opportunities. The authors consider it essential to identify global legal loopholes and therefore emphasize the need for complex, systemic solutions. They highlight that, based on contemporary technological possibilities, it is essential that, in addition to art history research, a scientific approach be integrated into the valuation process. Research into the painting materials used in artworks is also becoming increasingly important, as a work of art has physical and chemical properties that characterize an artist’s style just as much as the spirit of the artwork itself. The authors aim to highlight that the evaluation of works of art is not merely a process of stylistic analysis, but also a specialist and complex research task. A given work can be analysed down to its basic units, the coloured pigments, since the use of paint is just as unique as the brushstrokes. The knowledge base of the humanities is well complemented by chemistry and physics, and studies supporting art history can also provide new insights into the oeuvre of individual painters.

Based on a specific example, this study provides an overview of how the art market is linked to crime in the absence of a complex legal context. It discusses the legal challenges that arise and, consequently, how technological developments can help to curb crime.

The aim of the study is to convey new knowledge and systems, which is why the authors prefer applied research methodology. In addition to the qualitative analysis of the specific case study, it places the effects resulting from the abstraction of the specific findings related to the case in an interdisciplinary approach.

The starting point of the study is the results of the authenticity examination conducted by the Budapest Painting Examination Laboratory⁷ on Gustav Klimt’s Black Prince⁸, and the chain of events that allowed this work, valued at €15 million, to leave Hungary as an insignificant work by an unknown artist, without any scientific examination.

Although the recovery of the painting is now within the purview of the relevant Hungarian authorities, the study outlines the possibilities for eliminating the systemic deficiencies discussed.

APPROACH: THE KLIMT CASE – SYSTEMIC PROBLEMS AND LESSONS LEARNED

The protection of cultural heritage is a matter of strategic importance for every nation, going beyond mere interest in art history.⁹ It lies at the intersection of national identity, state sovereignty, and economic interests.¹⁰ UNESCO and ICOM (2021) have emphasized that the illegal trade in cultural property is not merely an economic issue, but an attack on cultural identity and sovereignty.

7 Under the guidance of art historian Zsófia Végyvári, the Painting Examination Laboratory she founded offers the opportunity to objectively examine works by both Hungarian and foreign artists. The work combines scientific material analysis with art historical research.

8 The results of the authenticity examination conducted by the Painting Examination Laboratory played a significant role in confirming the authenticity of the painting when it was taken abroad. However, they were not taken into account in the export license from Hungary. The results can be requested from the laboratory if necessary. The study was written with the knowledge of the results and with the collaboration of the laboratory manager, Zsófia Végyvári.

9 Cultural heritage is one of the most important carriers of community memory and national identity. Smith, detailing the social function of cultural heritage, emphasizes the role of community identity (Smith, 2006: 12). The 1972 UNESCO World Heritage Convention and the 2005 Faro Convention of the Council of Europe emphasize that the protection of cultural heritage is a public duty that serves the interests of society as a whole (UNESCO, 1972: 3; Council of Europe, 2005: 7).

10 The ‘cultural industry’ and the ‘heritage industry’ consider culture and cultural heritage as economic products (Major & Tomka, 2014).



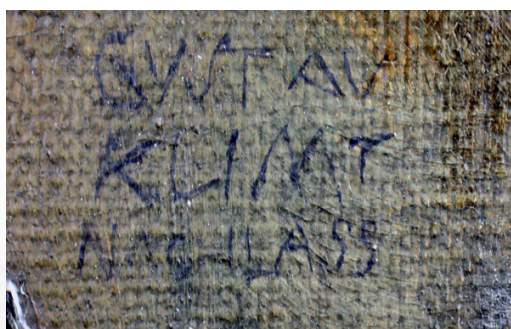
The so-called “Klimt affair”¹¹ that erupted in the spring of 2025 – the removal of Gustav Klimt’s painting, *African Prince* from Hungary – highlighted the shortcomings of the Hungarian heritage protection system, particularly in the areas of art export, identification, and professional responsibility.¹²

The case is not merely the result of an administrative error, but rather a symptom of systemic problems affecting the entire structure of cultural heritage protection. The aim of this study is to analyse the Klimt case as a case study and reveal the contradictions in Hungarian cultural heritage protection practices with particular regard to the dimensions of export licensing, expert evaluation, and national security considerations, but also to make specific recommendations for addressing these problems at a global level, beyond the Hungarian context.



Picture 1: *Gustav Klimt: African Prince*

The Hungarian authorities authorized the export as the work of an “unknown painter”, even though the stamp “Gustav Klimt Nachlass” on the painting was a clear reference to the artist. The artwork left the country with an export license and, less than a year later, appeared at the TEFAF art fair in Maastricht, now identified as a work by Klimt, with a price tag of €15 million.



Picture 2: *Gustav Klimt Nachlass*
(Photo: Zsófia Végvári)

11 See: <https://www.nytimes.com/2025/03/21/arts/design/rediscovered-klimt-african-prince.html>
<https://rmx.news/article/was-this-largely-unknown-and-long-missing-gustav-klimt-work-of-a-west-african-prince-illegally-smuggled-out-of-hungary/>
<https://edition.cnn.com/2025/03/19/style/lost-gustav-klimt-painting-african-prince/>

12 In Hungary, the protection of cultural assets is regulated by Act LXIV of 2001, which stipulates that all works of art older than 50 years require an export license. When granting a license, the authorities are responsible for determining the historical, artistic, and scientific value of the work of art, and if it represents “outstanding national value,” they may refuse to grant a final export license.

The press coverage surrounding the painting offered by the Wienerroither & Kohlbacher gallery in Vienna quickly went beyond the context of the art market and generated an international cultural diplomacy issue. Reactions in the Hungarian press and investigations by heritage protection agencies both highlighted that the export procedure had ignored the instrumental analysis carried out by the Budapest Painting Examination Laboratory, which had previously identified Gustav Klimt as the creator of the painting.

The Klimt case is not unique,¹³ but it clearly shows that legal frameworks alone are not sufficient¹⁴ and that, in addition to institutional and professional shortcomings, a lack of systemic cooperation can also be a source of crime. The case deserves special attention because the complex, unsystematic functioning of the legal system can be identified as the background to the crime. The Klimt case highlights the latent legal loopholes that may exist in the current legal environment and legal practice. Unravelling the case may indirectly help efforts to combat unlawful possession¹⁵ and restitution efforts in the broadest sense.¹⁶

The lack of a systematic approach increases the risk of both art loss and restitution problems.¹⁷ The Klimt case clearly demonstrates that the root of the problem lies in the lack of a systematic approach to the identification of works of art.

FINDING: TECHNOLOGY AND THE POSSIBILITY OF AN INTEGRATED SYSTEM

The protection of the authenticity of works of art, especially paintings, and the prevention of forgery is becoming an increasingly complex technological issue today (Frye, 2021). Due to the enormous value of the art market and the opaque chain of ownership, forgery and fraud pose a real threat. Traditional methods – documents, expert opinions, laboratory tests – play an important role, but today they are increasingly being supplemented by modern, integrated technological systems designed to ensure traceability, identifiability, and authenticity.¹⁸

Physical, chemical, and molecular markings are one of the oldest approaches, yet they remain effective today. Microscopic identifiers, known as microdots, or special glass or plastic particles can be invisibly mixed into the paint or protective coating and can only be identified under high magnification or through laboratory testing. DNA-based markings offer an even higher level of security, using synthetic

13 Similar cases have occurred in other countries, such as the issue of the return of the Elgin Marbles or the handling of the Gurlitt collection. These cases highlight that the protection of cultural property is not only a legal issue, but also an ethical and political one (Merryman, 2009: 212–215).

14 The Hungarian art export system strictly regulates the export of paintings abroad. Any hand-painted painting that is at least 50 years old and has a market value of 1 million Forints or more may only leave the country with official permission.

15 <https://edition.cnn.com/2025/03/19/style/lost-gustav-klimt-painting-african-prince/>

16 The term restitution refers to the return of cultural property to its original owner, which was unlawfully removed from the country and which the state or the owner may seek to recover. The “return” of objects stolen during illegal art trafficking and then found is also due to restitution procedures. Illegal trade in works of art can involve several stages and sectors, from theft to sale, until the objects are found and returned to their rightful owners. In this sense, restitution procedures mark the end of the process in the fight against illegal trade in cultural property. From these procedures, we can deduce the number of objects that have been recovered and returned, and by comparing this with the data from databases containing stolen objects, we can assess the success of national law enforcement agencies and international cooperation and organizations in this area (Lukács, 2022: 8).

17 Whether it is a matter of artworks unlawfully acquired during World War II or everyday theft, there are clearly relatively easy ways to remove the acquired artwork from the jurisdiction of the authority entitled to enforce restitution. After that, it becomes impossible to enforce any rights supported by law.

18 See: Major, 2022



molecular markers that can only be detected by special laboratories. Invisible UV or infrared active pigments and hidden markings further increase the difficulty of counterfeiting.

Physical markings can be supplemented with electronic identifiers such as RFID or NFC technologies. These tags, hidden in the frame or structure of the artwork, enable quick identification and inventorying, and can be queried using smartphones or dedicated readers. Although these solutions are vulnerable to removal and cloning, they can provide a reliable layer of protection through encrypted communication and physical embedding. Intelligent, IoT-based environmental monitoring can record transport and storage conditions, and the data can even be integrated into a blockchain-based event log.

One of the most promising ways to ensure digital authenticity is blockchain technology, which creates an immutable, time-stamped record. A digital certificate linked to a work of art can record changes of ownership, restorations, and exhibitions, ensuring that the work remains authentic and traceable. Blockchain alone does not prove physical authenticity, but when combined with physical identifiers such as DNA marking or micro-tags, it creates an extremely strong chain of evidence. In the future, tokenization and digital certificates (even in the form of NFTs, in a closed and authenticated environment) could further strengthen this system (Sztermen, 2023).

Advanced imaging and analytical methods are particularly effective in detecting forgeries. Multispectral and hyperspectral imaging can analyse the spectral reflection of pigments, providing layer-by-layer information about the structure of a painting, while X-ray, infrared, and CT scans reveal structural defects, underpaintings, and previous restorations. Raman, FTIR, and mass spectrometry analyses can accurately identify the materials used by identifying their chemical composition, which is particularly useful for period identification. 3D scanning and photogrammetry allow the microtopography of paintings – brushstrokes, crack patterns, and textures – to be recorded, serving as a digital fingerprint and making the object virtually impossible to forge.

Artificial intelligence further enhances this by recognizing patterns that are invisible to the human eye. Machine learning algorithms, such as convolutional neural networks (CNNs), are capable of recognizing an artist's unique brushstroke style, colour handling, or texture patterns, so the best systems use a multimodal approach that evaluates visual, spectroscopic, and historical data. The decision is returned in the form of a probability value, which makes authentication more objective and reproducible.

Of course, there are costs and risks associated with using these technologies. Laboratory testing, sensors, and recording systems can be expensive, and staff training and data security must be handled with care. Counterfeiters may also respond, for example by removing physical markings or forging digital certificates, so the security of the system needs to be continuously updated and audited. Legal and ethical aspects cannot be ignored either: a careful balance must be struck between protecting the owner's data and ensuring transparency in the art trade (Major, 2022).

The most viable solution is a multi-layered, integrated protection architecture: objects equipped with physical microdots and DNA markers, high-resolution digital fingerprints, RFID/NFC-based identification, blockchain-based digital certificates, and AI-supported monitoring. Such systems can be introduced gradually: first digital certificates and photo documentation, then physical markings and 3D scanning, and finally a comprehensive, decentralized database and AI monitoring (Lublóy, 2021: 27-29).

Overall, the key to success in combating counterfeiting is not a single technology, but the combined use of several complementary solutions. In the future, the authenticity of artworks can be ensured by a coordinated system of physical, chemical, and digital layers, which simultaneously preserves the cultural value of heritage and increases market security.¹⁹

¹⁹ See: PwC 2016



ORIGINALITY: FUTURE CHALLENGES AND RECOMMENDATIONS

The Klimt case study proves that the effectiveness of Hungarian cultural heritage protection can only be improved through a systematic approach. Official decision-making must integrate scientific expertise, the linking of databases, and international best practices. The Klimt case can be interpreted on several levels:

- At the level of law enforcement - where the export licensing process does not ensure adequate professional control. It would be necessary to digitize the procedures for authorizing the export of works of art and increase their transparency – it should be mandatory to attach electronic documentation to all export applications. By definition, this documentation must include the results of painting identification tests and ownership documents.
- At the institutional level - where communication between heritage protection authorities and background institutions is insufficient. Consequently, mandatory data sharing between background institutions and authorities is necessary. Continuous, verifiable communication must be ensured between the Painting Examination Laboratory and the Cultural Heritage Protection Office. In decision-making, the examination documentation of all works of art must be binding, thereby reducing the risk of professional opinions being ignored.²⁰
- At the level of national security, such as the loss of cultural heritage.²¹

“In a globalized world, regionalism and individualism are much more prominent, which has had an impact on the nature of crime and the nature of state action against crime. Whereas previously only a relatively small circle considered the protection of memories of the past as a priority, globalization has now increased the importance of material memories and the cultural heritage of individuals and communities. The need to preserve the material environment surrounding humans, including objects of artistic value, has grown stronger, and the individual/community past has emerged as a definite value. Collecting is much more widespread than it used to be and covers virtually the entire spectrum of the material environment surrounding humans. Commercial life has responded to the revival in demand: supply has increased, made possible by the wide selection offered by art dealers, auction houses, and companies specializing in counterfeiting” (Hudák, 2022: 15).

In summary, it can be concluded that the Klimt case is not merely an incident related to the export of a work of art, but a systemic warning that the protection of cultural heritage is a complex task involving legal, institutional, and international dimensions.²² Strengthening international cooperation in restitution and authenticity verification cases requires the harmonization of national legal frameworks and international conventions. The transnational art market is dynamic, so it is important that national authorities maintain contact with international professional networks and have access to a comprehensive database in order to respond quickly (Merryman, 2009: 220).

²⁰ For more on this, see: (Prott & O’Keefe, 1992: 138).

²¹ “Cultural property belongs not only to its legal owner, but to the cultural heritage of humankind” (Merryman, 2009: 54).

²² Drawing on contemporary corruption research, on the whole, value-consciousness, organizational development and risk analysis all discuss the phenomenon of corruption in a less exact way, but more in a ‘system culture’- dependent way. For models of this cross-boundary work the authors propose eight going beyond anti-corruption theory and using insights from organisational and social-system theory. System experts suggest that in the face of complex problems we need to engage in a collective inquiry among many disciplines, fields and experiences and to initiate a processual and dialogic approach that can create a new understanding and knowledge from the diverse insights and expertise of those who participate (Major & Cudan, 2023).



VALUE: CONCLUSIONS

The Hungarian art market is an integral part of the international art market, and crime and counterfeiting pose serious global challenges. The national legal environment, the work of the authorities, and technological developments can together help to ensure the long-term protection of cultural heritage, both national and global. Crime prevention and responsible art trade require a global, complex, system-level database. It is essential that:

1. Museums, auction houses, and galleries should implement increasingly stringent authenticity verification protocols to filter out counterfeits.
2. Databases should serve as documentation of authenticity and also help track works of art.
3. Cooperation in the broadest sense - between police, customs authorities, and art experts - is key to reducing crime.
4. Through education and awareness-raising, collectors, sellers, and buyers can make more responsible decisions.

SUMMARY

The art market is enriched by cultural heritage, but it is overshadowed by crime. Legal regulation and responsible trade are important tools in curbing abuse, but the challenges are constantly changing. Ultimately, it is our collective responsibility to ensure that culture is a treasure and not a source of crime. Complex problem-solving is the task of us all, and the operation of integrative databases is the primary responsibility of decision-makers. The Klimt case highlights that authenticity testing has now outgrown the conventional framework of art history, and it is therefore essential that the results of scientific testing be incorporated into the examination of the authenticity of works of art. The broadest possible consensus among heritage conservation experts is necessary. The challenge of overcoming the “silo effect” of fragmented operation has now spread to the cultural sphere (Tainter, 1988: 23).

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COUNTERING TRANSNATIONAL CRIME ON THE BALKAN ROUTE: THE ROLE OF INFORMATION SHARING AND CROSS-BORDER INVESTIGATIONS

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ABSTRACT

Purpose: Criminal networks continue to use the Balkan Route to smuggle drugs, firearms, migrants, and other goods into and across Europe, taking advantage of its geostrategic position and other conditions that make smuggling easier. At the same time, they constantly adapt and refine their tactics to stay ahead of law enforcement and avoid being detected. That’s why law enforcement has to advance the intelligence gathering and cross-border investigations to detect and suppress these illicit flows. Therefore, this paper aims to assess how transnational law enforcement cooperation contributes to more effective responses to the criminal networks operating along this route.

Design/Methods/Approach: This study uses a qualitative research design. It includes two methods: desk research of academic literature, including relevant institutional reports by international organisations and regional law enforcement initiatives, and case studies presenting successfully conducted regional operations. Also, the operational use of Joint Investigation Teams (JITs), regional intelligence-sharing platforms, and real-time data exchange mechanisms is analysed to evaluate their functionality and results.

Findings: Important improvements in the regional coordination and intelligence-sharing among the countries along the Balkan Route through different law enforcement initiatives are evident. This means that Western Balkan countries can be considered as credible participants in the international operations. Many examples of successful joint cross-border investigations have shown that intelligence-led operations significantly increase their efficiency and impact. However, certain gaps in national legal harmonisation, operational capacities, interoperability, and mutual trust among agencies still exist and limit the broader effectiveness.

Originality/Value: This paper contributes to the academic literature linking intelligence-led policing and cross-border investigations with transnational crime control along the Balkan Route by providing a regionally specific analysis. The findings and conclusions from the study show that international law enforcement cooperation through information sharing and conducting joint operations is vital for detecting and suppressing transnational crime along the route.

Keywords: Balkan route, transnational organised crime, information sharing, cross-border investigations, regional cooperation.

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INTRODUCTION

The Balkan Route remains a strategic corridor for transnational crime, including organised crime, which enables the smuggling of drugs, firearms, migrants, and other illicit goods into and across Europe. In the literature, as well as police circuits, several terms are used for this route, including “Balkan corridor”, “Western Balkan Route”, and “Balkan circuit” often interchangeably, to describe a transit zone marked by blurred entry and exit points (Hameršak et al., 2020). Since the corridor passes through other Balkan countries, not only the Western Balkan countries, in this paper, the term “Balkan Route” will be used.

The term “Balkan Route” is most commonly used to frame movements between Southwest Asia and Europe geographically. Its meaning varies across contexts: technically, it refers to geography, direction, or flows of people, money, and goods; politically, it reflects relations between Balkan states and the European Union; criminologically, it represents an area of police focus and securitisation; and culturally, it is tied to stereotypical representations of the Balkans (Stojić Mitrović, 2022). In this paper, the term “Balkan Route” will be used, referring to the geographical area that covers the Balkan Peninsula, used by the criminal networks for illicit trade across borders.

Recent migration flows emphasised the route’s dynamic nature, characterised by shifting patterns, intensities, and directions (Jano & Vještica, 2025). The Western Balkans route remains one of the main migratory paths into Europe. After reaching a peak in 2015, irregular migration declined for several years but has risen again since 2019 (European Council, 2025).

The Balkan Route continues to receive considerable scientific attention in Balkan studies and criminology. Besides a migration pathway, it is also an important corridor for illicit trade, because it facilitates the movement of different types of goods through many borders into and from Europe (Dimovski et al., 2013). Many factors have influenced the illicit trade and organised crime across the Balkan Route, including its geographical position, the opening of the Balkan road, Yugoslav liberalisation, economic crises, corruption, the 1992 sanctions against the former Yugoslavia, the arms embargo, and the broader transition period (Krasniqi, 2021).

In the last several years, due to the Euro-Atlantic integration and the support received from the international partners, improvement of the law enforcement and cross-border cooperation is evident. But



illicit trade networks have become increasingly dynamic, and they are adapting their modus operandi to the current political shifts, social changes, law enforcement measures, and technological change (Zoppi & Puleri, 2021).

The primary focus of the paper is to explore the role of transnational law enforcement cooperation in combating transnational crime along the Balkan Route, including the smuggling of drugs, firearms, migrants, and other illicit goods into and across Europe. First of all, it outlines the research purpose and methods before presenting the findings. The paper highlights how intelligence-led policing, cross-border investigations, and joint operations contribute to more effective responses against the dynamic nature of the criminal networks, thus strengthening security and stability. It also identifies key challenges, such as gaps in legal harmonisation, operational capacity, and mutual trust that hinder the effectiveness of the detection and suppression of transnational crime along the route.

PURPOSE

All the mentioned factors and conditions facilitate transnational crime on the Balkan route. In addition, loopholes in legal frameworks, institutional capacity deficiencies, and weaknesses of international coordination and cooperation, along with the advantages offered by technological advancements, render criminal networks capable of trading illicit goods across borders. They are also very flexible and adaptable in their operations, tactics, and methods, which makes it difficult for the authorities to detect, prosecute, and stop them from operating. Law enforcement, therefore, has to continually come up with new investigative tactics and focus their work on information exchange and improved international cooperation if they want to continue being effective in combating transnational crime along the Balkan Route.

For this reason, the purpose of this paper is to examine the role of intelligence gathering, intelligence sharing, and cross-border investigations in addressing the flows of illicit goods and activities along the route. More specifically, the paper evaluates how intelligence-led policing, combined with international and regional cooperation, can enhance the capacity of law enforcement to counter the evolving tactics of organised criminal groups.

The paper further explores the practical mechanisms of cooperation, including the involvement of international organisations, as well as regional law enforcement initiatives established in the Western Balkans. These mechanisms are assessed in terms of their ability to facilitate intelligence sharing, joint operations, and real-time data exchange. At the same time, the paper identifies the remaining obstacles and backlogs – such as gaps in legal harmonisation, operational capacity, interoperability, and mutual trust – that countries along the Balkan Route must continue to address to strengthen their collective response.

DESIGN/METHODS/APPROACH

The research is conducted through a qualitative approach, merging desk research and case study analysis. This design aims to capture the current dynamics of the Balkan Route, thus offering an understanding of how transnational crime is enabled and addressed in the area.

The desk research method maps the Balkan Route and illustrates its geographical paths. Also, it summarises the socio-political and economic factors that facilitate transnational criminal activities along the route. Academic literature, policy documents, and earlier studies are assessed to understand the



historical background and structural context of illicit flows in the region. Also, the review of the findings from the reports compiled by the major international organisations and regional law enforcement initiatives, such as INTERPOL, the World Customs Organisation, EUROPOL, FRONTEX, SELEC, SEEPAG, and the PCC SEE, is conducted. These relevant documents offer valuable insights into the characteristics and extent of illegal trade along the route (types, forms, and trends) and the operating procedures and tactics of criminal networks. It also reviews the trends recognised in intelligence assessments, risk evaluations, and operational analyses to show how criminal networks adjust their tactics to the enforcement methods and regional socio-political dynamics.

The research additionally includes examples of effective collaborative regional efforts. The case studies aim to showcase effective practices, operational insights, and results accomplished via cross-border collaboration. Special attention is given to the practical implementation of Joint Investigation Teams (JITs), regional intelligence platforms, and real-time data sharing systems in these cases. It aims to demonstrate how collaborative mechanisms can improve the efficiency of law enforcement actions.

Through the integration of insights from both methods (desk research and case studies), the research aims to identify the challenges and prospects in addressing transnational crime along the Balkan Route. This methodological design enables an evaluation of the function of intelligence-led policing, joint investigations, and international cooperation in addressing the evolving tactics of criminal networks along the Balkan Route.

FINDINGS

Transnational Crime Along the Balkan Route

The Balkan Route was first exploited as a major trafficking corridor for illicit opiates, particularly heroin, moving from Afghanistan to Western and Central Europe. Some claim it began in the 1970s (Scaturro, 2022). Originating in Afghanistan, it passes through the Islamic Republic of Iran and Türkiye before splitting into three main branches across the Balkan Peninsula (UNODC, 2014, EUDA & EUROPOL, 2024):

1. The Northern Branch: crosses South-Eastern Europe via Bulgaria and Romania, continuing into Western and Central Europe.
2. The Western Branch: passes through the most countries of the Balkans: Albania, Bosnia and Herzegovina, Croatia, North Macedonia, Montenegro, and Serbia, before reaching Western and Central Europe.
3. The Southern Branch: enters the European Union by moving from Türkiye into Greece and then on to Italy.

Importantly, this route does not function as a fixed corridor but rather as a dynamic network that constantly adapts to shifts in border controls, migration pressures, and regional or EU-level policy changes (Karaj, 2025).

Reports mention that opiates are consumed along the entire route, but the use of both heroin and opium is widespread in the Islamic Republic of Iran. Western and Central European countries (such as France, Germany, Italy, Poland, and the United Kingdom of Great Britain and Northern Ireland) remain the primary destinations and consumers for Afghan heroin (UNODC, 2025).

In addition to the Balkan Route, two other major trafficking routes supply Afghan opiates to international markets and, to a lesser extent, to Western and Central Europe. The Northern Route runs



through Central Asia into the Russian Federation, while the Southern Route passes through Pakistan and the Islamic Republic of Iran, serving consumer markets in Africa, Western and Central Europe, and South Asia (UNODC, 2024; UNODC, 2025).

The Balkan Route was primarily associated with the trafficking of illicit goods from the beginning. However, in 2015, with the migrant/refugee crises, it took on a new dimension when around 1.5 million refugees, asylum seekers, and migrants, who were forced to migrate in part due to the conflicts in Syria and Iraq, travelled through Türkiye and Greece to the Western Balkans, wishing to continue their trip to Western Europe (Scaturro, 2022). According to recent data reports published by FRONTEX (2024), the Western Balkan route remained the second most-used migratory pathway into the EU in 2023, with 99,068 irregular border crossings detected. This confirms the route's continued use by the migrants, although the figure shows a 31% decrease compared to 2022 (Siviero, 2024).

The Balkan route has increasingly become a key corridor for human trafficking networks exploiting the region's complex geography, porous borders, and socio-political challenges. Traffickers use this route to smuggle vulnerable individuals, particularly women and children, for purposes of sexual exploitation, forced labor, and organ trafficking. The Balkan Route represents one of the most significant pathways for human trafficking and migrant smuggling in Southeast Europe, beginning primarily in Türkiye as a major entry point from the Middle East and Asia (UNODC, 2022). Traffickers and smugglers strategically alter their pathways to exploit weak border management, limited regional coordination, and corruption, ensuring the continuation of illicit flows of people from recruitment zones to lucrative exploitation markets in Western Europe (Karaj & Xharo 2025).

The Western Balkan region continues to be a key source of illicit firearms trafficked into the EU (EUROPOL, 2025). It links surplus weapons from post-conflict zones and illicit manufacturing sites to demand markets across Europe and beyond (Šorović & Kostić Šulejić, 2025). Small arms and light weapons – often originating in the Western Balkans' legacy arsenals, the Black Sea region, and conflict-affected areas farther east – are moved along complex land and maritime corridors that mirror migration and drug smuggling pathways: across Turkey into the Balkans, through Bulgaria and Romania toward Central Europe, or via the Western Balkan chain through North Macedonia and Albania toward Adriatic ports and onward to Western markets. Traffickers exploit porous borders, corrupt official networks, and informal transport nodes to conceal shipments in mixed cargoes or using clandestine landings, and they continuously reconfigure routes in response to law-enforcement pressure and changing geopolitical dynamics (Prezelj, 2010). This adaptability, combined with fragmented national stockpile controls and uneven regional cooperation, complicates detection and interdiction efforts, amplifying the risk of weapons diversion into organised criminal groups, terrorist cells, and local violent conflicts—thereby posing a persistent threat to regional stability and public safety (EUROPOL, 2025).

The Balkan Route also serves as a versatile channel for a range of other illicit trades – most notably the trafficking of cultural goods, smuggling of gold and precious metals, and diversion of pharmaceuticals – linking source areas, transit hubs, and consumer markets across Europe and beyond (Prgomet, 2024). Looted antiquities and cultural artefacts move from conflict-affected or poorly protected heritage sites through informal networks and corrupt intermediaries, often concealed within legitimate consignments or diverted via secondary markets in the Balkans (Interpol, 2022). Illicit gold and precious metals, frequently originating from illegal mining or fraudulent trade schemes, are transported along the same land and maritime corridors, exploiting weak customs controls and opaque financial channels to enter global value chains. Similarly, the illegal trade in medicines – ranging from counterfeit pharmaceuticals to diverted prescription drugs – takes advantage of supply-chain vulnerabilities, regulatory gaps, and demand in more affluent markets (OECD/EUIPO, 2020). Traffickers adapt routes and their concealment methods to avoid detection and prosecution, using mixed cargoes, false

documentation, and transshipment points in regional ports and border crossings. Fragmented enforcement, inconsistent customs practices, and limited regional coordination increase the problem, allowing criminal networks to profit while undermining cultural heritage protection, public health, and legal market integrity across the region.

Cross-Border Cooperation Along the Balkan Route: Legal and Institutional Frameworks

The theoretical and legal framework on cross-border law enforcement coordination and cooperation reveals its complex nature with multilateral structures and bilateral mechanisms established for tackling illicit trade and transnational crime (Lemieux, 2010; Benyon, 1996). Existing challenges, such as divergent legal systems, different operational procedures in the countries, and political contexts, push law enforcement to cooperate at macro, meso, and micro levels (Brodeur, 1982). Multilateral cooperation offers structure and accountability, but bilateral initiatives provide flexibility and efficiency (Guille, 2013). Both are equally important for building resilient and responsive policing networks. This approach is foundational to addressing the increasingly sophisticated and borderless nature of today's criminal threats. As a result of such new and serious challenges and current emerging security threats, cross-border police cooperation requires a real-time, non-bureaucratic information exchange among all countries without geographical limitations (Kemeny, 2018).

Besides all the conditions that allow criminals to smuggle different goods and hinder the detection of this crime, not long ago, a UNODC report (2008) noted that the crime situation in Southeast European countries was improving. There are several factors that contributed to this trend. First, the region was "normalising" as it moved further along its transition to democracy and a market economy. Second, the region is also recovering from the conflicts of previous years. Third, this process was and is still supported by extensive efforts to strengthen regional cooperation on crime-related issues and to address shortcomings in national criminal justice systems, supported by the international partners providing relevant assistance.

International law enforcement cooperation is guided by agreements and directives from international bodies such as the United Nations, the Council of Europe, and the European Union, as well as regional initiatives established by the Balkan countries, such as the Southeast European Law Enforcement Centre (SELEC), the Police Cooperation Convention for Southeast Europe (PCC SEE), the Southeast Europe Policy Chiefs Association, the South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC), Integrative Internal Security Governance (IISG), and others. These agreements provide a framework for collaboration among countries to combat transnational crime effectively and ensure alignment with fundamental rights, data protection rules, and other shared legal frameworks. The Balkan region ratified the United Nations Convention against Transnational Organised Crime, as well as several protocols regarding the prevention of trafficking persons, smuggling migrants, and firearms manufacturing and trafficking. Law enforcement cooperation among Balkan countries (covering EU member states but also non-EU member states, part of the so-called Western Balkans) is active within all these broader regional frameworks and initiatives, as well as EU bodies.

INTERPOL, as a worldwide organisation, plays a significant role in facilitating police cooperation by enabling data sharing on crimes and criminals across borders. This is possible through a secure network called I-24/7 that allows real-time access to databases and sensitive and urgent police information for law enforcement agencies globally. Each member country hosts a National Central Bureau,



which serves as the focal point for all INTERPOL activities by seeking and sharing information with other countries.

Cooperation with Europol is well established in most of the Balkan countries under a strategic and operational agreement on the trafficking of human beings, weapons, drugs, and criminal networks. National police forces are able to share crime data between themselves and with Europol using the Secure Information Exchange Network Application. Most of the Balkan countries continue to cooperate with EU police services through the European Network of Fugitive Active Search Teams, with observer status, and the European Multidisciplinary Platform Against Criminal Threats (Zvekic & Vlassis, 2024). Recently, EUROPOL has established operational agreements with all six Western Balkan partners (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia), facilitating real-time information exchange, joint investigations, and enhanced cooperation. This collaboration has been further institutionalised through the establishment of liaison offices across the region (EUROPOL, 2019a). Additionally, initiatives like the Western Balkans Partnership against Crime and Terrorism (WB PaCT) project, implemented by CEPOL in partnership with EUROPOL, aim to bolster operational cooperation and capacity-building efforts in the region. These collaborative approaches to regional and European security risks and threats highlight the EU's commitment to integrating the Western Balkans into its security framework.

At the strategic and operational level, regional law enforcement action is coordinated primarily through SELEC and PCC SEE.

SELEC aims to enhance the cross-border police cooperation across the Balkans by providing a structured and operational platform for member states to jointly combat serious and organised crime. This includes intelligence exchange, joint investigations, and regional operations aimed at countering transnational threats, such as trafficking in drugs, weapons, and humans, and smuggling of migrants. It operates through eight specialised task forces, each addressing specific crime areas. It also fosters collaboration between law enforcement and customs agencies, engaging with over 25 international partners and observers, including Europol, Interpol, and UNODC. Its analytical outputs, such as the "Organised Crime Threat Assessment for South East Europe" (OCTA SEE), further provide member states with strategic insights into criminal trends, thus supporting more targeted and intelligence-led policing. SELEC has successfully coordinated several multi-country operations targeting different types of illicit trade along the Balkan Route, which have resulted in numerous arrests and the dismantling of transnational criminal groups.

SELEC created the Southeast European Prosecutors Advisory Group (SEEPAG) as a regional network of senior prosecutors established to enhance international judicial cooperation and facilitate mutual legal assistance among the countries of Southeast Europe. It promotes the exchange of legal knowledge, experience, and best practices among prosecutors, contributing to the harmonisation of legal procedures and fostering a culture of cooperation and trust within the region, including coordination of cross-border investigations and prosecutions, particularly in cases involving serious and transnational organised crime.

PCC SEE, as a multilateral treaty, aims to enhance cross-border police cooperation among its member states to combat serious and organised crime more effectively. It serves as a connection between the EU and the Balkans and provides a legal framework for the exchange of information, joint operations, and mutual assistance in criminal matters. The collaboration is facilitated through various mechanisms, including liaison officers, joint investigation teams, and the harmonisation of national legislation with European standards. It has been augmented by the PCC Prüm Agreement, a significant protocol that facilitates the automated exchange of DNA profiles, dactyloscopic (fingerprint) data, and vehicle registration data (VRD) among its member states. Modelled after the European Union's Prüm



Decisions, it enables law enforcement agencies to conduct cross-border searches in national databases, thus supporting the ongoing police investigations.

Bilateral police cooperation in the Balkans is well established on the basis of diplomatic agreements and collaboration on the ground. A significant number of police attachés support cross-border work on a daily basis, but ongoing political disputes in the Western Balkans continue to present an obstacle (Zvekić & Vlassis, 2024). Despite the necessity of closer cooperation, the intelligence cooperation between the Balkan countries is minimal and is limited to a narrow range of fields of common interest. It is a fact that globalisation has brought different challenges, trends, and ways of thinking. The Balkan countries have different views regarding certain areas in which intelligence services cooperate (Trifunovic, 2020). It can be explained further through the historical and political perspective. As long as Western Balkan countries remain outside the EU, their access to key law enforcement cooperation mechanisms is restricted, leaving gaps in collective security. Gradual integration into key EU structures and agencies is not just beneficial but necessary to strengthen security across Europe's southern flank (Zorić, 2025).

Cross-Border Cooperation in Practice: Operational Insights from the Balkan Route

This section presents selected illustrative case studies that show the importance of information-sharing and cross-border police cooperation for the effective investigation and prosecution of transnational crime across the Balkan Route. The selected operations cover a range of transnational criminal activities, including drug and firearm trafficking, precursor smuggling, illicit trade in cultural heritage items, and migrant smuggling.

Joint Investigation SUNSHINE (2017–2018)

This joint investigation was conducted under the coordination of SELEC and serves as a prime example of effective cross-border police cooperation in the fight against organised drug trafficking (SELEC, 2018). The 14-month-long investigation involved law enforcement agencies from Albania, North Macedonia, Greece, Italy, and Türkiye, targeting an organised crime group trafficking large quantities of marijuana across the Balkans and into Europe. The traffickers used a speedboat route from Albania to Turkey as their main modus operandi for drug transport. The operation concluded successfully on 12 May 2018, resulting in the seizure of a total of 8.4 tons of marijuana and the arrest of 66 individuals across multiple coordinated operations in the participating countries. This joint action not only disrupted a major trafficking network but also exemplified the strength of regional collaboration and set a precedent for future multilateral law enforcement efforts in Southeast Europe.

Joint Action Day (JAD) Western Balkans 2019

This major international operation coordinated by EUROPOL HQ in September 2019 brought together law enforcement from 30 countries, including EU member states and Western Balkan countries, to combat serious and organised crime in the region. Coordinated under the umbrella of the European Multidisciplinary Platform Against Criminal Threats (EMPACT), by facilitating real-time exchange of information, the operation focused on four strategic priorities: firearms trafficking, illegal immigration, document fraud, and drug trafficking. The operation brought together key EU agencies – Europol, Frontex – and institutional partners, including INTERPOL, UNODC, SEESAC, IPA/2017 Countering Serious Crime in the Western Balkans, PCC-SEE, and SELEC, showcasing a



comprehensive and coordinated response to cross-border crime in the region. Overall, JAD Western Balkans 2019 demonstrates the value of structured, multilateral collaboration in disrupting illicit trade and reinforces the importance of continued investment in regional partnerships and interoperable frameworks.

Operation TAKSIM

Operation TAKSIM represents a landmark case of successful cross-border police cooperation between North Macedonia and Turkey, facilitated through the SELEC intelligence-sharing platform (SELEC, 2022). Both countries coordinated a controlled delivery operation based on intelligence indicating the shipment of drug precursors from Shanghai to Skopje via Istanbul. The operation culminated in the seizure of 1,105 kg of precursors used in the production of amphetamine and methamphetamine, with a potential street value exceeding €50 million (which is one of the largest of its kind in the SELEC region).

Operation ANKH

Operation ANKH illustrates the effectiveness of regional law enforcement cooperation in tackling the illicit trafficking of cultural heritage items (SELEC, 2024). Conducted over two years and supported by SELEC, the joint investigation involved Bulgaria, Greece, and North Macedonia, aiming to dismantle an organised crime group operating in the illegal trade of historical artefacts. The case began when Greek authorities identified a Bulgarian suspect selling religious and historical items online, leading to his arrest and the seizure of a 17th-century cross and ancient coins. Subsequent coordinated actions led to further arrests and the recovery of over 1,100 items with cultural significance, including coins, helmets, antique jewellery, pottery, and medieval artefacts, but also confiscation of illegal firearms, ammunition, forged documents, and nearly €10,000 in cash. Operation ANKH demonstrates how joint intelligence sharing and coordinated operational planning across borders can effectively combat cultural heritage crimes.

Internationally active Albanian organised crime network engaged in cocaine trafficking busted

In early August 2025, Albanian law enforcement, with the support of Europol, carried out a coordinated crackdown on a clan-based organised crime network (EUROPOL, 2025a). The operation, conducted on 7–8 August, led to the arrest of 10 suspects involved in large-scale cocaine trafficking and money laundering. The investigation spanned multiple countries – Albania, working with Belgium, France, Germany, Italy, and the Netherlands – to dismantle a network with international links. The leader of the group, before the operation, was already wanted under a 21-year sentence from an Italian court for serious crimes, including murder and illegal possession of explosives, among others. A key piece of this operation was the use of data from Sky ECC, an encrypted communications platform dismantled in 2021. Despite its shutdown, the historical messages and metadata from Sky ECC continued to yield actionable intelligence, helping map out the structure of the network and identify high-value targets. Overall, this case demonstrates the power of international cooperation, intelligence sharing, and leveraging encrypted communication data – even after a platform has been shut down – to disrupt organised crime networks with global ties.



Six hundred migrants smuggled across the Western Balkans

In a cross-border effort to dismantle a migrant-smuggling network, law enforcement agencies made four arrests linked to a case involving over 600 people moved through the Western Balkans (EUROPOL, 2025b). The suspects allegedly coordinated the smuggling using encrypted messaging apps, allowing them to organise routes and evade detection. Authorities traced the network's operations to multiple locations and conducted searches at several sites, gathering electronic devices and other materials that helped piece together how the smuggling was organised. This operation proves that the Western Balkans remain a key transit region for secondary movements, where criminal networks actively offer their services to irregular migrants. The border section between Bosnia and Herzegovina, Croatia, and Slovenia has now emerged as a key route used to smuggle migrants from the Balkans into Western Europe. The case highlights the importance of international cooperation, intelligence-gathering, and technical investigation methods – especially involving encrypted communications – to counter increasingly sophisticated smuggling operations.

CONCLUSION

Over the past few decades, the Western Balkan countries have introduced significant reforms to harmonise their legislative and institutional frameworks regarding the investigation and prosecution of transnational crime with international standards (such as UN frameworks and the EU acquis). Also, important improvements in the regional coordination and intelligence-sharing among the countries along the Balkan Route (both EU and non-EU member states) through different law enforcement initiatives are evident. This means that Western Balkan countries can be considered as credible participants in the international operations. Many examples of successful joint cross-border investigations have shown that interagency coordination, timely information exchange, joint operational planning, and intelligence-led investigations significantly increase their efficiency and impact. The presented cases above offered insights into how well-coordinated enforcement actions can achieve certain significant results in tackling various forms of illicit trade and transnational crime. Improved intelligence sharing among participating countries made all those operations possible. As a collaborative effort, they are an important capacity-building opportunity for Western Balkan countries. They provide them the opportunity to strengthen their law enforcement practices by working alongside EU member states and to benefit from shared expertise. The scale and visibility of these operations sent a clear message to the transnational organised crime groups about the risks of cross-border criminal activity, and very likely they had a certain deterrence effect on them. However, certain gaps in national legal frameworks, operational capacities, interoperability, and mutual trust among agencies at the national and regional levels still exist. They harm the broader cross-border law enforcement cooperation. By understanding the nature of the transnational crime along the Balkan Route and possessing the relevant information, law enforcement can anticipate future threats, adjust its strategies and tactics, and effectively investigate and prosecute the illicit trade. Therefore, policymakers, law enforcement practitioners, and international security actors need to work together to improve the coordination and real-time information exchange. It is valuable for enhancing security and stability not only in South-east Europe but in the European Union as well, since the earlier criminal groups are dismantled, the less likely illicit goods are to reach its territory. Therefore, this leads to the conclusion that the Western Balkans has a strategic importance in addressing transnational crime.



ORIGINALITY/VALUE

This paper contributes to the academic literature by linking information sharing and cross-border investigations with transnational crime control along the Balkan Route. It provides a regionally specific analysis through presenting legal and institutional frameworks for law enforcement cooperation and how they function in practice. The findings and conclusions from the study show that international law enforcement cooperation through information sharing and conducting well-coordinated joint operations is vital for detecting and suppressing transnational crime along the Balkan Route.

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THE ROLE OF THE POLICE IN COUNTERING THE ILLEGAL POSSESSION AND TRAFFICKING OF FIREARMS IN THE REPUBLIC OF SERBIA

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ABSTRACT

Purpose: A prerequisite for successfully combating the illegal possession and trafficking of firearms is to encourage individuals who illegally possess firearms to hand them over to the police as part of legalization campaigns and to identify perpetrators under Article 348 of the Criminal Code through the use of modern proactive policing models. The aim of the research is to assess the outcomes of both approaches by the competent authorities, that is, the effectiveness of prevention and repression in this area of crime.

Design/Methods/Approach: The research refers to the period from 2018 to 2023. Normative and statistical methods, content analysis, formal and logical analysis, and comparative methods were used. Statistical data and verdicts related to the criminal offence from Article 348 of the Criminal Code obtained from the Statistical Office of the Republic of Serbia, the Ministry of Interior, and the courts, were analysed.

Findings: Greater efficiency and effectiveness in combating crime related to the illegal possession and trafficking of firearms is achieved through a combination of preventive measures and the implementation of appropriate investigative strategies based on proactive policing in detecting and prosecuting the criminal offence under Article 348 of the Criminal Code of the Republic of Serbia. The results of the investigations carried out show that in Serbia the quantity of firearms and ammunition voluntarily surrendered during legalization campaigns was significantly higher than the amount confiscated through criminal proceedings.

Originality/Value: Such researches have not been carried out on the territory of Serbia so far, and they can point out to the scientific and professional public the advantages of applying modern proactive police work models.

Keywords: firearms, legalization, criminal offence, penal policy, dark figure of crime

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INTRODUCTION

The issue of firearm possession by citizens in Serbia was brought back into focus after two mass murders that occurred in Belgrade, at “Vladislav Ribnikar” Elementary School on May 3, 2023 and in the villages of Dubona and Malo Orašje on the night of May 4–5 of the same year. In both cases, the perpetrators illegally carried firearms with them before committing the murders.

In the first case, the perpetrator was a child under the age of 14 who used a firearm, legally owned by his father, to take the lives of nine students and a security guard and wound five more students and a teacher. In the second case, the perpetrator, a young adult, committed the murders with a firearm that citizens are not legally allowed to possess (an automatic firearm). He was also in possession of explosives and other types of weapons. In addition to the perpetrator, who was sentenced to 20 years in prison for aggravated murder for using a firearm to kill nine people and wound 12, his father was also convicted of illegal possession of firearms and creating a common danger by omission for failing to prevent the illegal possession of firearms, which his son later used to kill several people (RTS, June 20, 2025).

The subject of this research will be the current situation regarding the acquisition and possession of firearms and ammunition in Serbia. The analysis will cover the legal regulations in this field, as well as the preventive and repressive measures undertaken by the state between 2018 and 2024 to reduce the number of firearms in both legal and illegal possession among citizens. Special attention will be given to the last two years of the analysed period, 2023 and 2024, in order to assess the effects of a series of measures introduced by the executive authorities following the mass murders, aimed at preventing the illegal possession of firearms.

LEGAL FRAMEWORK IN THE FIELD OF WEAPONS AND AMMUNITION

The Law on Weapons and Ammunition of 2015 (hereinafter: LWA) is the fundamental piece of legislation governing the acquisition, possession, carrying, collecting, repair, modification, trade, mediation, and transport of weapons and ammunition within the territory of the Republic of Serbia. A firearm is defined as a weapon that, under the pressure of gunpowder gases, ejects a projectile from the barrel (LWA, 2015, Article 3). The European Union Directive 2021/555 defines the term as “any portable barrelled weapon that expels, is designed to expel or may be converted to expel a shot, bullet or projectile by the action of a combustible propellant”. The Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, supplementing the UN Convention against Transnational Organized Crime, adopted on 31 May 2001 in New York and ratified by Serbia in 2005, defines it as “any portable barrelled weapon that expels, is designed to expel or may be readily converted to expel a shot, bullet or projectile by the action of an explosive, including antique firearms or their replicas”. The LWA, among other things, prescribes the conditions and procedures for the acquisition, possession, and carrying of weapons and ammunition by natural persons, and also provides for certain penal provisions establishing misdemeanour liability for violations of the law. The Criminal Code of the Republic of Serbia (hereinafter: CC), within the group of criminal offences against public order and peace, in Article 348 criminalizes the offence entitled “Unauthorized Production, Possession, Carrying and Trafficking of Weapons and Explosive Substances”. This criminal offence has a basic form, three aggravated forms, and one lesser form. The *actus reus* consists of unauthorized manufacture, modification, sale, acquisition, exchange, possession, and carrying, while the object of commission includes firearms, convertible or deactivated weapons, parts of such weapons, ammunition, explosive substances or explosive devices (Đorđević & Kolarić, 2020: 237–238). The



provisions of the LWA provide explanations of what is understood under each of these terms denoting the objects of the criminal offence. This means that the court is obliged to consult the provisions of the LWA when determining whether the criminal offence has been committed, since the Criminal Code itself does not define these terms.

The LWA classifies firearms into four categories (A, B, C, D) and determines under what conditions citizens may possess certain types of weapons. Firearms in Category A (explosive ordnance, automatic short and long firearms, disguised firearms, and firearms with silencers) may not be acquired, possessed or carried by natural persons. Firearms in Category B (semi-automatic, repeating, single-shot, double-barrelled, rifled and smoothbore firearms) and convertible weapons (gas, starter, and signal weapons) may be acquired only on the basis of authorization and after obtaining a permit from the Ministry of Interior (hereinafter: MoI).

New provisions of the LWA compared to previous legislation in this field relate, among other things, to the requirements for acquisition and possession of weapons by natural persons, particularly regarding medical fitness and training for weapon handling. As for legitimate reasons for possession, each applicant must: 1) for firearms in Category B intended for personal security, demonstrate the likelihood that his or her personal security may be endangered due to the nature of work or other circumstances; 2) for hunting firearms in Category B, submit proof of eligibility for a hunting license in accordance with the Law on Game and Hunting; 3) For sporting firearms, submit certification of active membership in a sports shooting organization (Leštanin, 2017: 164). If a natural person acquires a weapon without the authorization of the competent authority, he or she commits a criminal offence under Article 348 of the CC.

Based on an analysis of the basic form of the offence under Article 348 of the CC, it can be concluded, among other things, that the offender commits a criminal act if he illegally acquires and/or possesses deactivated weapons. However, the provisions of the LWA classify this type of weapon, along with antique weapons and certain types of air weapons, into Category C, for which no authorization is required for adults, but only a mandatory notification to the competent authority using a prescribed form accompanied by proof of origin. Failure to comply constitutes a misdemeanour under Article 47 of the LWA. This raises the question of criminal liability in such cases, since the acquisition of deactivated weapons is permitted under the LWA, while illegal possession contrary to its provisions constitutes only a misdemeanour. Furthermore, the object of commission in the basic form of the offence also includes explosive substances and explosive devices. However, the LWA does not define “explosive substance”, while explosive devices are classified into Category A, meaning that natural persons may neither acquire nor possess them. Consequently, the basic form of the offence under Article 348 of the CC cannot be committed in this context, since the first aggravated form presupposes the objects of the basic form (explosive substances, explosive devices or means based on explosive substances, explicitly mentioned) whose manufacture, sale, acquisition, exchange or possession is prohibited to citizens. The basic form carries a sentence of imprisonment from six months to five years and a fine, while the first aggravated form carries a sentence of one to eight years of imprisonment and a fine. At this point it is also necessary to mention the Law on Explosive Substances, Flammable Liquids and Gases (later amended by the Law on Flammable Liquids and Gases), since it regulates matters defining the objects of commission of the criminal offence under Article 348 of the CC (Marković, 2016: 252).

The second aggravated form of the offence is committed if the object of the basic or first aggravated form is a larger quantity of weapons, ammunition or devices or if the weapons or devices are of great destructive power or if the offence is committed contrary to the rules of international law. The prescribed punishment is imprisonment from two to twelve years.



The third, more serious form exists if the perpetrator illegally carries the objects of the basic or first aggravated form, with the same penalty range as the second aggravated form.

The lesser form of the offence involves the unauthorized carrying of the objects of the basic form if the perpetrator has authorization from the MoI for acquisition and possession, and the prescribed punishment is identical to that of the basic form, but without a fine.

LEGALIZATION AND VOLUNTARY SURRENDER OF UNREGISTERED WEAPONS WITHOUT ESTABLISHING LIABILITY FOR ILLEGAL ACQUISITION AND POSSESSION

Following the two incidents in May 2023 that resulted in mass murders committed with firearms, the Serbian executive authorities introduced a moratorium on the issuance of firearm acquisition permits. By a Government Conclusion, the Ministry of Interior (MoI) was instructed to “take all measures within its competence to ensure a moratorium on the issuance of permits for the possession and carrying of short firearms (permits for firearm acquisition, firearm licenses, etc.) for a period of two years”. The MoI was also instructed, among other things, to review all issued firearm possession permits within three months, and within six months to inspect how permit holders store their firearms, particularly whether legal requirements for safe storage are met, whether firearms are stored separately from ammunition, and whether access to firearms and ammunition is adequately restricted for minors and other unauthorized persons (Government Conclusion, 05 No. 56-3807/2023). Considering the number of registered firearms in Serbia and the available human resources of the MoI, it is evident that it was not possible to carry out inspections of all firearm permit holders within that period.

Previously, in Serbia, an average of about 15,000 requests for firearm acquisition were submitted annually. Between 2015 and 2021, around 80,000 requests were submitted for hunting firearms and around 15,000 for firearms for personal security (Rajković, 2022). Between 2016 and 2022, registered firearm owners voluntarily donated to the state just under 115,000 firearms for personal security and around 40,000 hunting firearms (Rajković, 2022). These data indicate that the number of registered firearms in Serbia had been steadily decreasing even before the two incidents. The main reason for this was most likely the annual tax on firearm ownership. In addition, the LWA of 2015 requires firearm owners to undergo medical examinations every five years as a condition for permit renewal. Firearm owners who no longer wish to keep their weapons often cannot sell them due to low demand and thus decide to donate them to the state. We consider the increase in firearm taxation a good way to reduce the number of registered firearms; however, such a measure may also lead to an increase in illegal possession of firearms. Severe penalties prescribed for the illegal acquisition and possession of firearms have limited deterrent effect, as in Serbia, due to frequent wars in the past and strong traditions, it is customary to “keep a firearm in the house”. The MoI data show that following the mass murders in Belgrade, Dubona, and Malo Orašje, the number of registered firearms in Serbia decreased from 766,665 in May 2023 to 594,880 in February 2024 (PrEUgovor, 2024). During that period, harsher penal policies regarding illegal acquisition and possession of firearms were brought back into focus. We believe this was one of the reasons why many firearm owners decided to return and donate their weapons. The Ministry of Justice, within the framework of the existing working group for amendments to the Criminal Code, considered the amendments concerning offences related to illegal possession, carrying, and trafficking of firearms, as well as the possibility of amending juvenile criminal liability in this field, including lowering the age of criminal responsibility from 14 to 12 years, in line with international standards. The Minister of Interior issued the Order on the Surrender of Unregistered Firearms (“Official Gazette of RS,” No. 37 of 5 May 2023, No. 46 of 7 June 2023). The order stipulated



that for owners who surrendered firearms between May 5 and June 30, 2023, no proceedings would be conducted regarding proof of origin of the firearms or establishing liability for illegal possession and carrying. During this two-month period, citizens surrendered 82,398 firearms, 4,243,139 rounds of ammunition, and 26,485 explosive devices to the MoI (PrEUgovor, 2024). These figures also include registered firearms and ammunition surrendered by owners who no longer wished to keep them. The order was adopted on the basis of Article 46 of the LWA. However, that provision actually regulates the legalization of firearms and ammunition. The LWA defines legalization as the process of “registration or surrender of unregistered firearms or ammunition held without authorization from the competent authority, where proof of origin of the firearms and ammunition is not required, and owners who register or surrender them during the legalization period cannot be prosecuted either for misdemeanour or criminal offences of illegal acquisition, possession or carrying of firearms and ammunition”. We therefore conclude that legalization implies either registration or surrender of unregistered firearms and ammunition. However, this particular order did not provide for registration but only for surrender of firearms without a permit from the competent authority, without establishing liability for acquisition and possession. It is worth noting that in both legal theory and practice there is an ongoing debate as to whether the criminal offence under Article 348 of the Criminal Code is effectively decriminalized during the legalization period. Although the purpose of the order in line with Article 46 of the LWA was not the suspension of this offence, court practice in many cases has accepted the position that, during the legalization period, criminal prosecution of offenders illegally possessing and carrying objects of the offence under Article 348 of the CC is permanently excluded (Decision of the Court of Appeal in Kragujevac, Kž2-79/18 of 08.02.2018, rejecting the appeal against the decision of the Higher Court in Kragujevac Kv-349/17 of 26.12.2017). However, with regard to acts such as selling, acquiring, purchasing, aiding or mediating in such actions, case law has taken the opposite stance: that criminal prosecution of offenders who committed such acts during the legalization period is not excluded (Judgment of the Basic Court in Kraljevo, K 195/18 of 11.12.2018; Judgment of the Higher Court in Kraljevo, Kž 20/19 of 21.02.2019; and Judgment of the Supreme Court of Cassation, Kzz 877/19 of 24.10.2019).

PERPETRATORS OF THE CRIMINAL OFFENCE “UNAUTHORIZED PRODUCTION, POSSESSION, CARRYING, AND TRAFFICKING OF WEAPONS AND EXPLOSIVE SUBSTANCES”

Results of numerous studies show that perpetrators of criminal offences involving firearms, ammunition, and explosive devices (such as murders, robberies, extortions, etc.) are, in the vast majority of cases, men (read more in: Marković, 2016; Marković, 2024a; Kolarić & Marković, 2024; Marković & Kolarić, 2025). The perpetrators of serious criminal offences most often use firearms that are possessed illegally. There are several reasons for this. For example, it is more difficult to identify a perpetrator who used an illegal firearm than one who used a legal one. Moreover, the perpetrators of serious crimes are often recidivists who do not meet the security requirements for possessing firearms, and therefore acquire illegal weapons for the purpose of committing criminal acts. For this reason, in the next section of the paper, we will analyse the number of reported, indicted, and convicted individuals for the offence under Article 348 of the Criminal Code.

From the chart 1, we conclude that during this seven-year period a total of 6,986 individuals were reported for the specified criminal offence. Of that number, 376 or 5%, were women, which also indicates that this is an overwhelmingly “male” criminal offence. Historically, firearms have primarily been associated with men, and the data show that this remains the case today. The fewest reported per-



petrators were in the Belgrade region, 1,101 individuals or slightly less than 16%, while the most were in the Southern and Eastern Serbia region, 2,169 individuals or 31%. In Šumadija and the Western Serbia region, 2,105 individuals or 30% were reported, and in the Vojvodina region 1,611 individuals or 23%. We conclude that this criminal offence is significantly more prevalent in the two regions located in the northern part of Serbia.

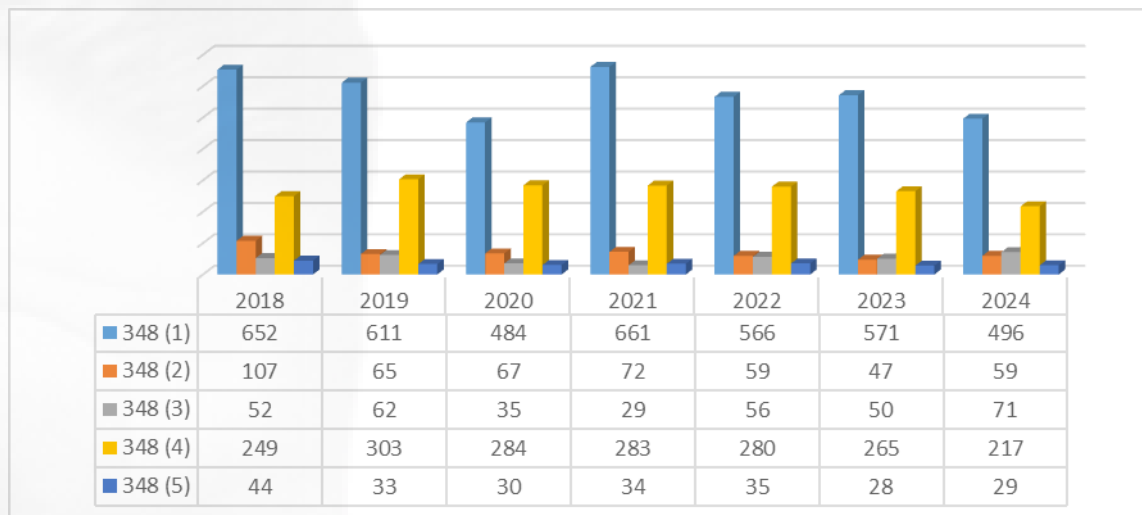


Chart 1: *Number of Reported Individuals for the Offence under Article 348 of the Criminal Code*

The majority of reported individuals were charged with committing the basic form of the offence. In total, 4,041 individuals were suspected of illegally acquiring, possessing, selling or exchanging weapons and ammunition whose acquisition and possession are legally permitted. The highest number of perpetrators was reported in 2021, and the lowest in 2020. Following this, the third aggravated, most serious form of the offence comes next. A total of 1,881 individuals were reported for illegal carrying of weapons and ammunition. The fewest reported perpetrators were for the lesser form of this offence, i.e., individuals who possessed registered firearms but carried them illegally. In total, 233 individuals were reported for this form of the offence. It is noticeable that in the last two years, fewer suspects were recorded for this form of the criminal offence.

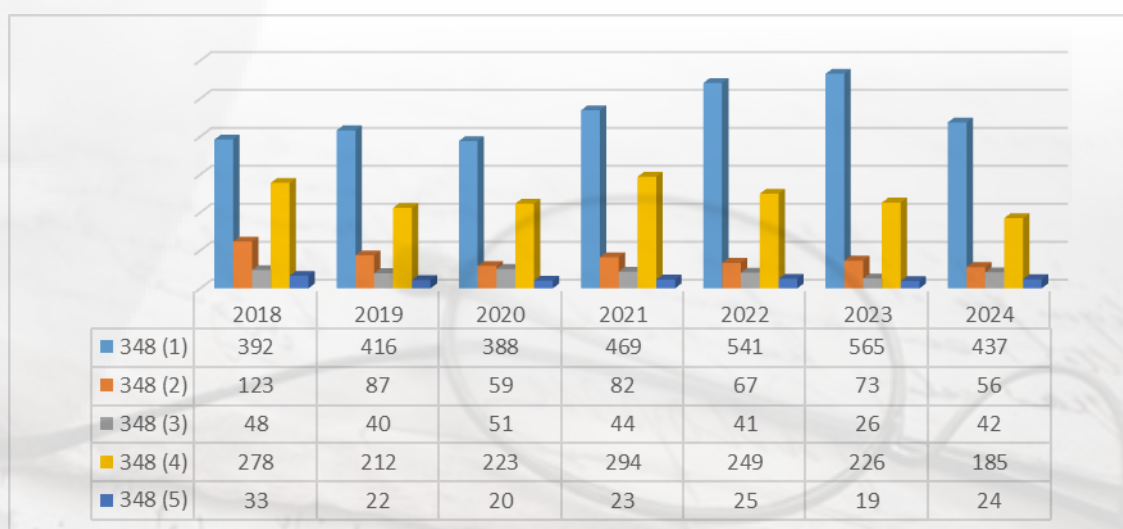


Chart 2: *Number of Indicted Individuals for the Offence under Article 348 of the Criminal Code*

During the analysed period 5,882 individuals were indicted. The majority were indicted for the basic form of the offence, totalling 3,208 individuals, followed by the most serious form of the offence, with 1,667 individuals, and the fewest for the lesser form of the offence, totalling 167 individuals. The indicted individuals were predominantly men, while women accounted for only 260 individuals or 4.4%, leading us to conclude that the proportion of women among the indicted is even smaller compared to the reported individuals.

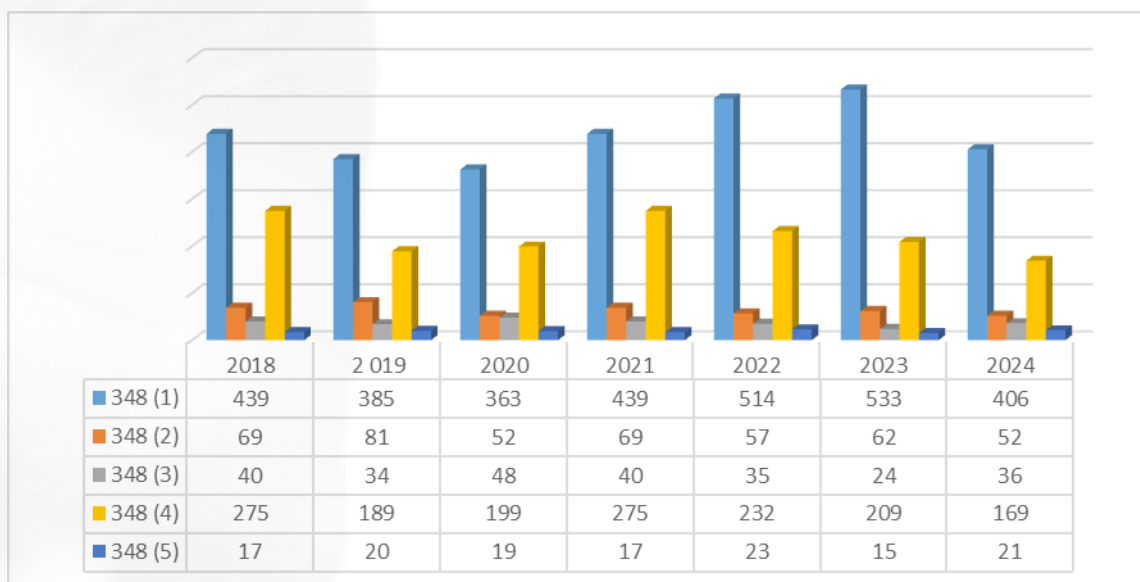


Chart 3: Number of Convicted Individuals for the Offence under Article 348 of the Criminal Code

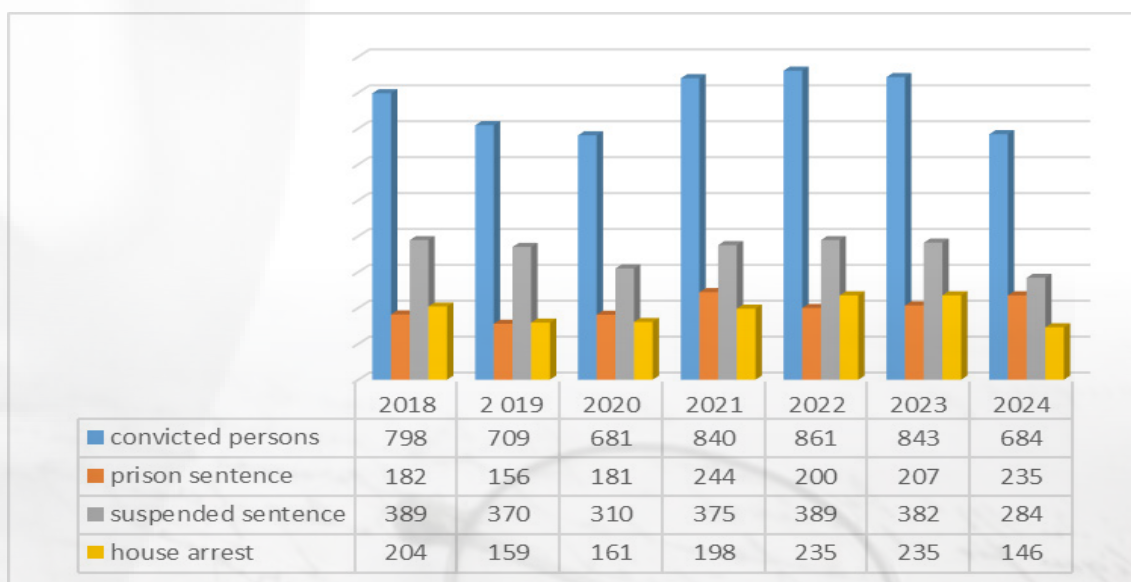


Chart 4: Number of Convicted Individuals for the Offence under Article 348 of the Criminal Code and Type of Conviction

Interestingly, the number of convicted individuals during the analysed period is only slightly lower than the number of indicted individuals. A total of 5,416 individuals were convicted, 92% of all those indicted. This suggests that the indictments were well-prepared and supported by sufficient evidence necessary for conviction. Of the 260 indicted women, 233 were convicted, which is slightly less than

90%. The proportion of convicted women in relation to the total number of convicted individuals is 4.3%. The fewest convicted individuals for this offence were recorded in 2020, with 681 individuals, and in 2024, with 684 individuals, while the highest number was in 2022, with a total of 861 individuals. For the basic form of the offence, 3,079 individuals were convicted; for the most serious form, 1,548 individuals; and for the lesser form, a total of 132 individuals.

During the analysed period, a total of 5,416 individuals were convicted, of whom 1,405 or 26%, received a prison sentence, 2,499 or 46%, received a suspended sentence, and 1,338 or 25%, were sentenced to house arrest. We conclude that the majority of individuals were convicted with a suspended sentence, with the annual number of such convictions ranging between 370 and 390. The only deviations were in 2020, with 310 convictions, and in 2024, with 284. The number of individuals sentenced to prison was the highest in 2021, followed by 2024. The proportion of prison sentences was 22% in 2019 and increased to 34% in 2024. This indicates that the judicial penal policy was tightened in 2024, following the mass murders that occurred in 2023.

Over the two-year period from 2023 to 2024, 1,527 individuals were convicted for this offence, of whom 319 or 21%, were recorded as repeat offenders. A total of 80 women or 5.2%, were convicted, of whom 35 or 44%, were over 60 years old. Male perpetrators were also most frequently over the age of 60, with 307 individuals or 21%, in this age group. A total of 111 foreign nationals or 7%, were convicted, of whom 29 were from the European Union countries. The majority of convicted foreign nationals were citizens originating from outside the European continent. This was influenced by mass irregular migrations from Asia and Africa to the developed European countries, as a significant migration route (the Western Balkan route) passes through the territory of Serbia (read more in: Mijalković, Bajagić & Popović Mančević, 2023; Milašinović, Janković & Milojević, 2023; Marković, 2025b). Armed conflicts between organized smuggling groups competing for control over smuggling channels in Serbia, which escalated at the end of 2023, led to increased police control in border areas, primarily at the borders with Hungary, Bulgaria, North Macedonia, and Bosnia and Herzegovina, resulting in the seizure of significant amounts of firearms (read more in: Marković, 2025; Marković, 2025a; Marković, 2024; Janković, Marković & Ivanov, 2024).

CONCLUSION

The results of the conducted research show that the most frequent perpetrators of the criminal offence involving illegal acquisition and possession of weapons and ammunition are men, citizens of Serbia, over the age of 60, who have not been previously convicted, and that the most commonly imposed sanction is a suspended sentence. At the same time, the number of confiscated weapons and ammunition during repressive measures is significantly smaller compared to prevention campaigns, when citizens are encouraged to voluntarily surrender unregistered weapons without facing penalties. The number of voluntarily surrendered unregistered firearms in May and June 2023 demonstrates that citizens still possess a large number of illegal weapons. In fact, the largest number of weapons surrendered during a legalization period occurred in 2003 after the assassination of the Prime Minister of Serbia, when 82,769 firearms and 2,226,765 rounds of ammunition were handed over (Marković, 2023: 560). In the twenty-year period between 2003 and 2023, several other weapon legalization campaigns were conducted, but the number of surrendered weapons was significantly lower. During the 2007 legalization, 8,455 firearms and 11,566 rounds of ammunition were surrendered; in 2015, a total of 7,545 firearms and 160,434 rounds of ammunition; in 2016, 1,410 firearms and 61,755 rounds of ammunition; and in 2017, 1,104 firearms, 124 hand grenades, 189 explosive devices, and 57,852 rounds of ammunition (Strategy for Small and Light Weapons Control for the Period 2019–2024). The last weapon legalization



before the mass murders in May 2023 was conducted from 16 March 2020 to 16 June 2020 (Order on Weapon Legalization) and was unsuccessful. It was subsequently extended for two additional months, until 17 August 2020. This means that repressive measures regarding illegal possession and carrying of weapons and ammunition were suspended for five months in 2020. During this period, citizens who had unregistered weapons could surrender them to the police without undergoing procedures to verify the origin of the weapons or to determine responsibility for illegal possession and carrying. However, the goal was not achieved, as only a very small number of weapons was surrendered. The data from 2023 indicate that citizens still possessed a vast quantity of unregistered weapons and were unwilling to legalize or surrender them during previous legalization campaigns. We conclude that only after major social upheavals caused by serious criminal acts that disturb public order on a large scale, and due to increased fear of detection and sanctioning, do citizens voluntarily surrender firearms that they previously possessed illegally. The most recent campaign aimed at the surrender of firearms resulted in positive outcomes, including in terms of voluntary relinquishment of legally held weapons. Nearly 50% of the surrendered weapons were registered, but citizens chose to donate them to the state. This also led to a significant reduction in the number of registered weapons in Serbia.

In conclusion, citizens of Serbia still hold a large quantity of unregistered firearms. Repressive measures alone do not produce effective results among the population. The research results show that as many as 79% of convicted individuals had not been previously convicted for criminal offences. The state must find ways to encourage citizens, through preventive measures, to relinquish unregistered weapons and surrender them to the police, while stricter repressive measures should target recidivists who will undoubtedly continue to hold illegal firearms, as they serve both as instruments for committing crimes and as status symbols within the criminal subculture.

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ARMED SECURITY GUARDS IN HUNGARY: HISTORICAL DEVELOPMENT, LEGAL FRAMEWORK AND OPERATIONAL CHALLENGES

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ABSTRACT

Objective: The objective of this study is to present the institution of armed security guards (ASGs) in Hungary, to trace its historical development, examine the evolution of protected assets and facilities, and analyze the legal, organizational, and technological framework that defines its operation. Special attention is given to the role of ASGs in the protection of critical infrastructure, public utilities, and other facilities of strategic importance to the functioning of the state.

Approach: The paper applies a descriptive and analytical approach. It relies on Hungarian and international academic literature, statutory regulations, and professional guidelines related to law enforcement, risk-based security, and critical infrastructure protection. Technological development is examined in direct relation to the operational tasks performed by armed security guards.

Findings: The analysis shows that armed security guards constitute a unique hybrid institution within the Hungarian security system. Although they operate under civilian employment conditions, they perform public security tasks requiring the lawful use of force and advanced security technologies. Their effectiveness depends on the coordinated operation of manpower, legal regulation, and integrated technical protection systems.

Value: The study highlights the need for legislative modernization, coherent training and continuing education systems, and sustainable financing models. It also emphasizes the importance of civilian control, transparency, and accountability in maintaining legitimacy and public trust in ASG operations.

Keywords: armed security guards; public safety; critical infrastructure protection; risk-based security; resilience of critical organizations

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INTRODUCTION

Security is a social product and a fundamental necessity for both society and the individual. According to Finszter, danger is exclusively a threat that attacks socially protected values, and its origin may be natural, technological, or intentional human activity (Finszter, 2010). Absolute security does not exist; accordingly, the objective of security policy is to reduce risks to an acceptable level through legal, organizational, and technical measures.

The historical development of the Hungarian private security sector provides an important context for understanding the later emergence of armed security guards. As demonstrated by Rottler and Kovács (2022), the evolution of private security in Hungary was shaped by both facilitating and constraining regulatory factors. While statutory regulation was necessary to ensure legality and professionalism, early regulatory frameworks also revealed tensions between effective state oversight and operational viability. This historical dynamic highlights how state regulation has continuously defined the boundaries between public and private security functions, within which the institution of armed security guards later developed as a distinct, state-supervised form of security provision.

Every state has a fundamental interest in protecting state functions, public welfare, irreplaceable cultural heritage, and assets vital to national defense, national security, and law enforcement. Traditionally, these protection tasks have been carried out by the police and the armed forces. In Hungary, however, a specific solution has evolved: armed security guards perform armed protection tasks while remaining outside the system of state law enforcement bodies, thus occupying a special position within the national security architecture.

Certain sectors, such as nuclear energy and international air transport, are governed by international regulatory frameworks that prescribe minimum protection requirements. Within these sectors, national authorities retain responsibility for determining the organizational form of protection. The Hungarian armed security guard system thus represents a nationally specific and unique institutional response embedded in an international regulatory environment, rather than an isolated domestic solution.

THEORETICAL AND CONCEPTUAL FRAMEWORK

The functioning of armed security guards can be interpreted within the framework of risk-based security and critical infrastructure protection. Risk-based approaches focus on the identification of threats, the assessment of probabilities and consequences, and the proportional allocation of protective resources (Kaplan & Garrick, 1981; Aven, 2016).

Critical infrastructure protection aims at safeguarding assets whose disruption would have severe consequences for societal functioning, public safety, or national security (Rinaldi, Peerenboom, & Kelly, 2001). These concepts are complemented by the notion of civilian control, which emphasizes transparency, accountability, and democratic oversight over organizations authorized to apply coercive measures (Loader & Walker, 2007; Prenzler & Ronken, 2001).

HISTORICAL DEVELOPMENT OF ARMED SECURITY GUARDS IN HUNGARY

The roots of organized civilian guarding in Hungary date back to the civil guards established in 1914. These organizations operated nationwide on the basis of uniform rules and procedures, and their activities were strictly bound by law and official instructions (Christián, 2022).



The institutionalized protection of industrial and public service facilities was established through the creation of the Industrial Guard in 1953. Operating under the control of the Ministry of the Interior, the Industrial Guard provided armed protection for nationalized large companies, transport systems, and energy facilities (Szigeti, 2025).

By the 1960s, the Industrial Guard developed into a nationwide organization and was unified under the designation of a civilian armed guard. Following the political transition of the 1990s, the role and legal basis of civilian armed guarding were fundamentally transformed, culminating in the adoption of Act CLIX of 1997 and its implementing regulation, Decree 27/1998 (VI. 10.) BM.

LEGAL AND ORGANIZATIONAL FRAMEWORK

The establishment of armed security guards is decided by the police, while the obligation to finance their operation is imposed on the owners or operators of the protected facilities. Originally, only the police were authorized to order armed security protection; since 2011, this competence has been extended to heads of relevant ministries.

More recently, a government decree adopted in 2024 introduced additional provisions concerning the issuance of special personal and property protection certificates, further strengthening centralized risk assessment and regulatory control in the ASG system.

This regulatory logic is consistent with earlier developments in the Hungarian private security sector. As Rottler and Kovács (2022) emphasize, the first statutory-level regulations of private security were designed to delineate clearly the boundaries of permissible activities while preserving effective state oversight. These early regulatory dilemmas continue to resonate in the legal framework governing armed security guards, particularly regarding licensing, supervision, and the balance between public authority and private operation.

Armed security guards are employees subject to Act I of 2012 on the Labor Code (Mt.), which clearly distinguishes them from state law enforcement officers. Interpretative challenges arise from the overlapping provisions of criminal procedure law, misdemeanor law, and the Act on Personal and Property Protection (Be., 2017; Szabs. tv., 2012; Szvmt., 2005).

These interpretative challenges are particularly relevant in operational situations involving apprehension and detention. While criminal procedure law permits any person to apprehend an offender caught in the act, misdemeanor legislation and personal and property protection law establish additional procedural obligations regarding proportionality, necessity, and immediate handover to police authorities (Be., 2017; Szabs. tv., 2012; Szvmt., 2005).

In ASG-protected facilities, this legal complexity may result in uncertainty regarding the scope of permissible action. Consequently, clear internal protocols, continuous legal training, and close cooperation with the police are indispensable to ensure lawful and effective intervention by armed security guards.

CHALLENGES, RISKS AND CIVILIAN CONTROL

In recent years, the scope of tasks and competencies assigned to armed security guards has expanded beyond traditional facility protection. ASGs are to an increasing extent involved in the protection of correctional facilities, border-related infrastructure, and immigration detention centers, where elevated security risks and the potential for violent incidents require enhanced preparedness and clearly defined operational powers.



This expansion reflects broader changes in the security environment, including migration-related pressures and the growing need to protect state-managed facilities that operate under exceptional legal regimes. In these contexts, armed security guards often perform tasks that closely resemble those of sworn law enforcement officers, while remaining subject to civilian employment status and labor law.

The widening of ASG responsibilities also raises questions regarding professional preparedness and equipment. Previous professional experience indicates that the effectiveness of armed security guards in high-risk environments is closely linked to structured command training, regular continuing education, and access to appropriate non-lethal and, where justified, automatic or semi-automatic firearms (Szigeti, 2022).

From an organizational perspective, the introduction of standardized 'unit set' equipment concepts, similar to those applied in police services, may enhance operational flexibility. Such arrangements allow on-duty shifts to deploy reinforced armament when justified by risk assessment, while maintaining proportionality and legal compliance.

The long-term operation of armed security guards presents organizational, financial, and human resource challenges. Operators bear responsibility for maintenance costs, continuous training, and the provision of appropriate technical resources (IAEA, 2016; IAEA, 2021).

Civilian control represents a key element of legitimacy for organizations exercising coercive powers. In the case of armed security guards, civilian oversight mechanisms, public reporting, and complaint procedures enhance transparency and accountability (Vári, 2020a; Vári, 2020b).

From a historical perspective, the importance of civilian control in security governance has already been highlighted in private security regulation. Rottler and Kovács (2022) point out that insufficient transparency and weak oversight mechanisms in the early phases of private security development posed risks to legitimacy and public trust. These lessons are directly applicable to the contemporary operation of armed security guards, where civilian oversight remains a crucial safeguard against the misuse of coercive powers.

OPERATIONAL ENVIRONMENT AND TECHNOLOGICAL DEVELOPMENT

The scope of facilities protected by armed security guards includes objects of national defense, national security, nuclear facilities, public utilities, assets of cultural importance, as well as central telecommunications and broadcasting facilities. In the 2010s, critical infrastructure protection requirements, particularly in the nuclear sector, significantly expanded protection obligations (Government Decree 190/2011; OAH, 2022; Act LXXXIV of 2024).

In addition to classic mechanical security elements, integrated electronic security systems play an increasingly important role. Access control, intrusion detection, video surveillance, fire alarm and extinguishing systems, and centralized monitoring platforms form the backbone of modern facility protection (Tóth, 2023a).

Criminological research confirms the deterrent effect of video surveillance, especially when cameras are clearly visible, monitored in real time, and integrated with active intervention mechanisms (Gill & Spriggs, 2005; Welsh & Farrington, 2008; Vári et al., 2025).



At the same time, the extensive use of surveillance technologies raises data protection and privacy concerns. In the ASG environment, compliance with purpose limitation, data minimization, and transparency requirements is essential, in accordance with European data protection guidelines (EDPB, 2020).

The operational effectiveness of armed security guards is to an increasing extent determined by the integration of technological solutions into everyday guarding activities. Unlike purely private security services, ASGs operate in environments where the protection of state interests, critical infrastructure, and public services requires a higher level of reliability, continuous operation, and regulatory compliance.

In the Hungarian system, armed security guards are typically responsible for facilities where technological failure or malicious interference (sabotage) could result in severe societal consequences. These include nuclear facilities, drinking water supply systems, energy infrastructure, transport hubs, and healthcare institutions (Government Decree 190/2011; OAH, 2022; Act LXXXIV of 2024). Accordingly, technological protection measures used by ASGs must support uninterrupted operation, rapid detection, and immediate intervention.

Beyond traditional mechanical protection, modern ASG-supported facility security relies on integrated electronic security systems. Access control and identification systems regulate the movement of personnel and vehicles within protected areas, while intrusion detection systems provide early warning against unauthorized access. These systems are particularly important in ASG-protected facilities, as they allow armed guards to concentrate their physical presence at critical points rather than performing continuous patrols over large areas (Tóth, 2023a).

Video surveillance systems (CCTV) represent a core technological tool in the operational practice of armed security guards. Experience in facility protection shows that CCTV does not function as a stand-alone security solution, but significantly increases effectiveness when combined with trained personnel and clearly defined response protocols (Gill & Spriggs, 2005; Welsh & Farrington, 2008). In ASG environments, cameras support situational awareness, incident reconstruction, and evidence preservation.

Based on experience in facility security and public-space surveillance, CCTV represents a key element of physical and technical protection as part of electronic alarm systems. While CCTV alone does not provide complete protection, its preventive and deterrent effects have been empirically demonstrated (Tóth, 2023a). The effectiveness of surveillance systems depends significantly on the targeted training of operators and is statistically correlated with operators' employment status, gender, and age; purpose-oriented training produces measurable improvements in performance (Tóth, 2023b).

Both international and domestic research indicates that surveillance systems are most effective when detection is followed by immediate, 'active intervention'. This approach increases the success rate of responses, particularly in cases of violent crime, while crime-related effects are not merely displaced but often diffusely reduced in surrounding areas as well. An evaluation framework can be developed to measure and compare effectiveness, supporting not only operational audits but also security planning and system design.

With the rapid proliferation of security technologies, the 'price of convenience' is that previously visible control points may become 'invisible' risks. Consequently, in layered facility protection the balance between user convenience and the visibility of surveillance must be consciously designed (e.g. camera markings, warning signs, access logging). In the ASG environment, this necessitates enhanced transparency requirements, including purpose limitation, data minimization, defined retention periods, and, where required, data protection impact assessments (DPIA), in line with legal and ethical standards applicable to public video surveillance (EDPB, 2020).

In practical terms, this entails the integration of 'privacy by design' and 'privacy by default' principles, public information measures and camera maps, as well as strict role- and access-management proce-



dures in the operation of CCTV and access control systems, particularly at critical entities. Camera networks optimized primarily for convenience but deployed sporadically or integrated poorly carry a higher risk of function creep and loss of public trust; accordingly, real-time operation, lawful information provision, and regular audits constitute prerequisites for both effectiveness and social acceptance.

The effectiveness of surveillance systems has also been confirmed by criminological research. Based on a questionnaire survey conducted within a prison population, the deterrent effect of CCTV was found to be comparable to the presence of uniformed police officers, particularly when cameras were clearly visible, monitored in real time, and integrated with police patrol activity ($n=172$; 76% vs. 74% 'maximum' deterrent effect) (Vári et al., 2025).

In the same study, 82% of respondents indicated that cameras installed in public spaces would deter criminal activity, while 81% believed that even a clearly visible CCTV warning sign has a preventive effect. Overall, 83% attributed a crime-preventive impact to surveillance systems. At the same time, a negative correlation was identified between time spent in detention and fear induced by cameras, suggesting that the longer an individual had been incarcerated, the less they were influenced by the mere presence of CCTV. This finding supports the need for targeted, risk-based interventions. Consistent with international evidence, the magnitude of the effect is highly dependent on location and type of crime: reductions are particularly notable in property crime, whereas sporadic and non-integrated deployment may lead to territorial displacement. The combination of real-time surveillance and police presence yields the most substantial results (Vári et al., 2025).

Empirical research confirms the deterrent effect of surveillance systems when operated under conditions relevant to ASG work. Hungarian criminological studies indicate that visible, real-time monitored cameras can produce a deterrent effect comparable to that of uniformed police officers (Vári et al., 2025).

The integration of video analytics and behavioral analysis further enhances ASG capabilities, but requires strict compliance with data protection principles, including purpose limitation, proportionality, and data minimization (EDPB, 2020).

Cyber-physical convergence also shapes the technological environment of armed security guards. The integration of physical security systems with IT and OT creates new vulnerabilities that must be addressed through network segmentation, logging, and continuous monitoring (NIST, 2023; Humayed et al., 2017).

Due to cyber-physical convergence, the operational environment of armed security guards to an increasing extent includes cybersecurity considerations. In ASG-protected facilities, physical security systems such as CCTV, access control, and intrusion detection are often integrated with information technology (IT) and operational technology (OT) networks. This integration improves efficiency and situational awareness, but simultaneously introduces new vulnerabilities that require risk-based management approaches (IAEA, 2016; NIST, 2023).

International nuclear and critical infrastructure guidelines emphasize that IT/OT integration must be accompanied by network segmentation, hardening, logging, and continuous monitoring in accordance with the principle of defense in depth (IAEA, 2021; Humayed et al., 2017). For armed security guards, this means that effective physical protection can no longer be separated from cybersecurity awareness, as cyber incidents may directly compromise physical access controls and surveillance capabilities.

In high-risk sectors such as nuclear energy, international standards emphasize the principle of defense in depth, which requires the coordinated operation of human, organizational, and technological layers (IAEA, 2016; IAEA, 2021). Within this system, armed security guards represent the human layer supported by technological force multipliers.



CONCLUSIONS AND RECOMMENDATIONS

Beyond financing and operational challenges, the long-term development of the armed security guard system is closely linked to the issue of institutionalized interest representation. At present, armed security guards operate within a fragmented professional environment, where representation of interests, professional standards, and collective advocacy are limited and uneven.

International experience in the regulation of security professions shows that chamber-type organizations or statutory professional bodies can play a key role in balancing state oversight with professional autonomy. Such bodies typically contribute to the development of ethical standards, qualification requirements, and continuous professional education, while also serving as interlocutors between the state, employers, and practitioners.

In the Hungarian context, the introduction of a chamber-type model for armed security guards could enhance coherence within the sector. A centralized professional body could support the harmonization of training curricula, facilitate the dissemination of best practices, and contribute to the consistent interpretation of legal norms affecting ASG operations.

From the perspective of civilian control and accountability, institutionalized interest representation may also strengthen transparency. A chamber-type organization operating under statutory regulation could participate in complaint-handling mechanisms, professional audits, and disciplinary procedures, thereby reinforcing public trust in armed security guard activities.

Importantly, the establishment of such a body would not diminish state authority over the use of coercive measures. On the contrary, clearly defined professional representation could complement police and ministerial supervision by embedding compliance, training, and ethical considerations directly within the professional community.

Accordingly, the exploration of a chamber-type or hybrid interest representation model represents a potential avenue for future reform. By strengthening professional identity, supporting continuous development, and facilitating structured dialogue with the state, such a model could contribute to the sustainable evolution of the armed security guard system.

The financing of armed security guard operations represents one of the most sensitive and structurally challenging issues of the Hungarian ASG system. Under the current regulatory framework, the state defines the obligation to provide armed protection, while the financial burden of maintaining the guard is largely transferred to the owners or operators of the protected facilities.

This model reflects the legislator's intention to externalize the costs of protection to entities that directly benefit from enhanced security. However, in the case of facilities providing essential public services—such as drinking water supply, energy distribution, healthcare institutions, and other critical infrastructure—this approach raises questions of proportionality and state responsibility.

As highlighted in professional and academic discourse, the uninterrupted operation of critical services is a core state interest, regardless of the formal ownership structure of the operating entity. Consequently, the exclusive allocation of security costs to operators may place disproportionate financial pressure on organizations whose primary function is the provision of public services rather than profit generation (Szigeti, 2022).

In the context of drinking water supply, for example, security failures may have immediate and far-reaching consequences for public health and social stability. From this perspective, the protection of such facilities cannot be treated solely as a private operational matter, but must be understood as a component of public service continuity and national resilience.



International practice in the field of critical infrastructure protection to an increasing extent emphasizes shared responsibility models, where the state assumes a more active role in supporting the financing of security measures at facilities of strategic importance. Such support may take the form of direct subsidies, targeted grants, or co-financing schemes linked to compliance with enhanced security and resilience requirements.

In the Hungarian ASG system, the introduction of similar mechanisms could contribute to a more balanced distribution of responsibilities. State involvement in financing would not only alleviate the economic burden on operators, but also strengthen regulatory oversight, as financial support could be conditioned on compliance with professional, training, and transparency standards.

From a governance perspective, the question of financing is closely linked to the broader issue of public accountability. If armed security guards perform tasks that directly serve public safety and the protection of essential services, a purely market-based financing model may undermine long-term sustainability and strategic planning.

Accordingly, the reconsideration of financing arrangements represents a key element of future reform. A mixed model combining operator contributions with targeted state support could enhance the resilience of critical infrastructure, improve the professional standing of armed security guards, and better reflect the public interest nature of their tasks.

The Hungarian armed security guard system has undergone significant historical, legal, and technological development. Nevertheless, both the primary legislation and its implementing regulations require modernization to meet contemporary security challenges.

Taken together, these developments point toward a broader paradigm shift in security governance. Rather than focusing exclusively on static protection measures, contemporary ASG operations increasingly emphasize organizational learning, measurability of effectiveness, and multi-level responsibility systems. This shift aligns armed security guards with modern risk-based and resilience-oriented approaches to critical infrastructure protection.

From a professional perspective, the reform of education and training systems, the clarification of legal competencies, and the development of balanced financing solutions are essential. A coordinated, risk-based approach combined with transparent civilian oversight can ensure the long-term effectiveness of armed security guards in protecting critical infrastructure and public safety.

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MAINTENANCE OF PUBLIC ORDER (AND PEACE) IN SERBIA: BRIEF HISTORICAL-LEGAL REVIEW

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ABSTRACT

Purpose: Public order (and peace) as an area of social life in Serbia is currently a very important topic in the context of organizing various types of protests where the police have a very important role in maintaining order (and peace). The aim of the research is to answer questions such as what the incrimination of certain human behaviors that threaten public order looked like throughout history, what the decriminalization of certain human behaviors looked like in the context of protecting public order (and peace) depending on social development, moral values, etc.

Design/Methods/Approach: The authors use the historical-legal method to analyze the development of the legal protection of maintaining public order, and the normative method to analyze the norms of regulations.

Findings: The authors identified four periods in the development of legal protection of the maintenance of order as a public service: the Middle Ages, the period after liberation from the Turkish occupation, the period after World War II, and the modern period, in which certain peculiarities but also similarities in the legal regulation of public order are observed. The analysis of the regulations identified the basic variables of the legal regulation of public order and peace, which were analyzed. In the legal regulation of maintaining order as a public service, the substantive and procedural aspects are emphasized. Through substantive law, the legislator enacts provisions on misdemeanours and defines certain aspects that were important for the area of public order at that time. The procedural part of the legislation regulated specific actions of state bodies, primarily the police, which had the ultimate goal of maintaining public order (and peace) as a public service.

Originality/Value: The scientific approaches of exploring public order's history can contribute to a better investigation and prosecution of contemporary forms of crime and misdemeanors. Researching the history of maintaining public order in Serbia leads to a better understanding of the contemporary legal regulation of this area of social life. The next step is to better understand the public order maintenance as a form of policing, which will achieve better results in investigating and establishing violations of public order as a form of crime.

Keywords: public order, public service, law, police, Serbia

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INTRODUCTION

According to the 'word of the law', the police are an organized way of performing legally regulated tasks, consisting of police officers who, in performing police and other internal affairs, protect and promote the security of citizens and property, respecting the constitutionally guaranteed human and minority rights and freedoms and other protected values in a democratic society, with the possibility of using means of coercion in accordance with the constitution and law (Art. 3 of Police Law, Official Gazette 6/16). Some other laws, such as the law of the German state of Baden-Württemberg and the Swiss Canton of Lucerne, also define the police but emphasize its role in maintaining public order (Nikač, Leštanin, 2017: 225). The tasks of the police in Sweden, among others, are to prevent crime and disturbances of public order and safety as well as to maintain public order and safety, prevent its disruption and take action when disruption occurs (Mann, 1999: 9-11).

When observed throughout history, from the very beginning of the creation of the State until today, it is possible to conclude that the appearance of the police function and organization is a part of a wider process of constitution of military-political institutions of government. Their appearance expresses the need that can be easily recognized throughout history, which is the need of the political authorities themselves for their own stability and security. The first forms of police authority and organization functioned to protect the political order of the government, and only over time did they acquire their modern dimension and segment, that is, the suppression of various forms of deviant behavior of individuals and the protection of the legal order, and only in a modern democratic state did the protection of property and personal security of all citizens arise (Zekavica, 2018: 11).

In theory, the police are defined depending on the criteria that are primarily taken into account. Thus, Jugović and Simović (2016) consider the police as a part of the state administration (executive authority), or an organizational unit, or a basic organizational unit of the Ministry (organic element) organized for the purpose of maintaining public order and security (functional element), and which applies legally established police and other powers (formal and material element), including means of coercion (coercive element). Milosavljević (1997) believes that the police should be defined as a complex professional type of a system, which is organized for the purpose of maintaining public order in society and which is provided with legal powers and necessary means, including means of coercion,



for these purposes. The term “police” is primarily used to denote a specially organized service, or multiple services, for maintaining public order and peace, for preventing and repressing crime, and for enforcing the law, as well as the members of that service or services (Mojanoski, Kulić, 2012: 40).

Regardless of which definition we take into account, the fact is that the police are a state body responsible for maintaining public order and peace. Public order (and peace) is both a constitutional and a legal category. Maintaining public order involves preventing violations of public order, or restoring public order that has already been violated. This police work is primarily carried out by uniformed police through foot patrol, patrolling by car and permanent command center activities (Leštanin, Nikač, 2016: 42). One of the ways to violate public order (and peace) is by means of violence, but according to one study, public order encompasses a much broader sphere of social life, since violence is only one segment. The revision of the legal text in 2016 brought not only new offenses but also certain controversies, especially regarding the scope of protection of public order, which is limited to public places (Leštanin, Nikač, 2016: 341).

The aim of the research is to answer the question of how the incrimination of certain human behaviors that threaten public order has progressed, as well as their decriminalization depending on social development, moral values, etc.

METHODS

Public order and peace as an area of social life is currently protected in Serbia by both criminal and misdemeanor law². Therefore, the authors use the historical-legal method to analyze the development of legal protection of public order, as well as the normative method to analyze the norms of regulations. As the main source of data, the authors used legal texts as well as historical literature, the content of which was analyzed.

FINDINGS

Middle Ages

The beginning of Serbian statehood is associated with the unification of Serbian lands and the achievement of independence from Byzantium. The most significant legislative activity dates back to the time of the adoption of Dušan's Code, and therefore our analysis began from that time. The text of the Code contains incriminations of certain forms of violation of public order. Adapted to today's forms of manifestation, at that time the following were punished: quarrel (Art. 131), indecent behavior (Art. 50), insult (Art. 50, 55, 95a, 97, 98, 166), insulting an official (Art. 111), committing violence (Art. 101 and 166) and witchcraft (Art. 20, 109) (Bubalo, 2010).

Quarrels are primarily prohibited among soldiers, with the possibility of resolving the conflict by duel and other soldiers are prohibited from participating in it. Indecent behavior and insults consisted of swearing, pulling out beards, tearing clothes, removing hats from heads or humiliating in some other way, and the perpetrators could be lords, nobles and commoners. However, they could also be victims, with the addition of the bishop as the injured party, where a stricter fine was issued. Insulting an official was aimed at protecting the judge from humiliation in any way, where both individual and collective sanctions were issued (punishing the entire village). On the one hand, the Code generally prohibited violence in the context of debt collection. On the other hand, special attention was paid to

² Further reading in Tukar, 2019



the commission of violence by assault (physical force or cold weapons) but also to insults in a state of drunkenness, for which rigorous corporal punishment was imposed. Witchcraft consisted of a ban on removing bodies from graves, where collective responsibility was imposed at the village level, but also covered fortune-telling in general, casting spells, using poisonous potions and herbs, etc.

When it comes to sanctions (penalties) for illegal behavior, the Code issued fines and corporal punishments, such as beatings or burning of the beard. The enormous influence of the Orthodox Church is noticeable, as well as a clear difference in punishment depending on status. For nobles, punishments were milder, i.e. fines, while for lower social statuses, fines and corporal punishments were cumulative.

Considering the fact that the text of the Code was rewritten over the centuries, it can be concluded that it was also in use during the Turkish occupation among the Serbian population. Turkish legislation in the occupied Serbian territory at that time was based on Sharia law and mainly aimed at suppressing resistance and rebellion of the Serbian population (Alimpić, 1905: 17-33).

The period after liberation from Turkey

The liberation of Serbia from the Turkish occupation began in 1804, accompanied by significant legal activity aimed at establishing state institutions. The regulation of the area of public order and peace only came into play in 1850 with the adoption of the Regulation on how police authorities will treat and punish police offenders, popularly known as the Police Directive Act. Most of the offenses known today in the area of public order and peace were also provided for in the Police Directive Act, with the exception of impudent and reckless behavior. It must be emphasized here that at that time, when the Serbian state and its institutions were being re-established, the police were one of the main organs of public authority through which all regulations (municipal, sanitary, veterinary, etc.) were enforced. Thus, the Police Directive Act from 1850 contained norms that defined various offenses, which were divided into twenty chapters. This regulation did not deal with the definition of public order and peace, a public place, or offenses against public order and peace.

In Chapter Two 'On Public Peace', the following offenses are issued: quarrelling, shouting, failure to respond to a call or order to disperse gathered citizens, and discharging firearms (Krstić Mistrđželović, 2009: 419-420). Here it can already be seen that the condition was that the offenses were committed in a public place. In addition, indecent behavior, insults, scuffles, insulting an official, leaving dangerous objects, vagrancy, committing violence, noise (especially near religious buildings), gambling, prostitution and witchcraft were also classified as offenses.

Penalties for public order offenses included fines as the most common, imprisonment (several types of sentences) and corporal punishment in the form of blows to the body (corporal punishment was abolished in 1873). In this period, too, one can see a difference in the method of punishment based on status in society. For example, there was the punishment of 'house arrest', that is, imprisonment served under house arrest and which could only be imposed on selected people (Krstić Mistrđželović, 2009: 428).

As for the procedural part of the Police Directive Act, the municipal courts of reconciliation, district and district mayors and the Belgrade City Administration were competent for conducting the procedure. Municipal courts of reconciliation were competent for minor offenses for which a lighter corporal punishment, imprisonment for up to 3 days and a small fine were issued. More serious offenses were referred to the district or district mayors, or to the Belgrade City Administration. At that time, the Police Directive Act also regulated the manner of police action when collecting evidence (investigating) disturbances of public order and peace, the use of criminal objects as evidence, as well as measures to secure the accused in the form of detention that was counted towards the future sentence, and even certain forms of protection from torture and torment.



An analysis of the legal regulations passed in the period from 1850 to 1949 leads to the conclusion that the original monarchy, plagued by various wars waged in the Balkans, did not deal with the specific regulation of the area of public order.

The period after the Second World War

The communist government established after the liberation from German occupation decided only in 1949 to pass a special Law on Misdemeanors against Public Order and Peace – ZPPJRM/49, Official Gazette of the PR Serbia 13/49. Offenses against public order and peace included behavior or actions that disrupted the normal way of life of citizens, obstructed movement and traffic on streets and other public places, created unrest among citizens, violated public morals, interfered with the proper use of public facilities and residential buildings, spent time in idleness, interfered with citizens' rest or otherwise violated social discipline and peace of citizens (Art 1 of ZPPJRM/49). With this definition, the emphasis is on the normal way of life and social discipline and peace of citizens. The fact that the offence was committed in a public place is not part of the essence of the offence and this law did not deal with the definition of public order and peace or a public place.

All actions that exist in the modern era were issued as misdemeanors, with the exception of violence, reckless behavior, and noise. It must be emphasized that insulting officials was directed at all public authorities, not just police officers. The law at that time did not define the actions that constitute misdemeanors, but only issued them as such (fighting, arguing, etc.). Typical misdemeanors of that time were behaving in a rowdy manner, allowing an unreported or prohibited public gathering to be held on someone's property, violating an order of a state authority prohibiting access to or staying in a certain place, fabricating or spreading false news, refusing to provide assistance during some emergency, indulging in drunkenness, engaging in smuggling or black-market trading, abusing animals, failing to respond to a summons from a competent authority, etc. (Art 2 of ZPPJRM/49). Parental or guardians' liability for violations of public order was issued for if the child committed a violation due to neglect or if they incited the commission of a violation. City, local and district state authorities had the authority to classify certain behaviors as violations against public order and peace through their general acts (Art 5 of ZPPJRM/49). This authority was abolished by the Law on Amendments to the Law on Misdemeanors against Public Order and Peace, Official Gazette 34/56.

In addition to the fact that there was a regulation on public gatherings (the Law on Associations, Assemblies and Other Public Assemblies), the ZPPJRM/49 also regulated the registration of public gatherings and gave the police the authority to prohibit gatherings if there was a danger of endangering public peace and order. Consequently, a misdemeanour offence was also introduced, consisting of organizing and holding unregistered or prohibited public gatherings, and even assisting in this (Art 4 of ZPPJRM/49).

The misdemeanor sanctions prescribed for misdemeanors against public order and peace are a fine, 'corrective' labor, which is the equivalent of today's community service, imprisonment, confiscation of property, expulsion, and community service. Considering that for certain misdemeanors, alternative punishments were issued, the imposition of corrective labor or imprisonment together with a fine was possible for more serious misdemeanors if one of two conditions was met: 1) if it was assessed that the fine was not sufficient to have a corrective effect on the perpetrator of the misdemeanor or 2) if the perpetrator is known for violating social discipline and failing to fulfill work and other obligations. If the state body conducting the proceedings concluded that the perpetrator who had already been punished would continue to commit misdemeanors, it could also impose community service on him/her (Art 3 and 6 of ZPPJRM/49).



In terms of procedure, the district and city police authorities were responsible for conducting the procedure for determining responsibility and imposing sanctions in the first instance. Community service could be imposed by a special commission/board of these authorities.

Subsequent social development led, after 20 years, to the adoption of a new Law on Misdemeanors against Public Order and Peace – ZPPJRM/69, Official Gazette 20/69. Offenses against public order and peace include behaviors or actions that endanger the safety of citizens, disrupt the unhindered movement of persons in public places, the use of public facilities, residential and other buildings, as well as the performance of official duties of state bodies and work and other organizations that exercise public authority (Art 1 of ZPPJRM/69). It can be seen that the legislator is making a turn when defining offenses against public order and peace because the emphasis is on the safety of citizens, the work of state bodies and public authorities. The fact that the offence was committed in a public place is not part of the essence of the offence but rather represents a qualifying circumstance, and the law still does not deal with the definition of public peace and order. A public place is understood in particular to mean a place where there is free access to an unspecified number of persons without any conditions (streets, squares, public roads, piers, waiting rooms, catering, trade and craft shops, public transport, etc.), or under certain conditions (sports stadiums and playgrounds, cinemas, theatres, concert halls, exhibition spaces, etc.) as well as other places that are used for such purposes at a certain time (land or premises where public gatherings, competitions, etc. are held) (Art 6 of ZPPJRM/69). This is the first time that the legislator has dealt in more detail with the definition of a public place as an essential element of misdemeanor liability. The essential elements of the definition are free access (unconditional or limited conditional), an unspecified number of persons, and other places for specific purposes. However, the application of the law has been extended to other places that are not public but are accessible from a public place (balconies, terraces, courtyards) or if the offence occurred in a public place.

This legal text introduces the misdemeanors of violence, reckless behavior and noise, but witchcraft is omitted. In addition to persons, legal entities and responsible persons may also appear as perpetrators of misdemeanors. Objective liability of parents or trustees is introduced because they have failed in their duty of care and a minor has committed a misdemeanor. For the first time, voluntary contributions and pyrotechnic devices are regulated in the field of public order.

The misdemeanor sanctions that could be imposed were penalties and protective measures. The penalties were a fine and imprisonment, and the protective measures were the confiscation of the object of the misdemeanor and mandatory treatment for alcoholism.

Only a year later (1970) there were amendments to the law that were aimed at expanding misdemeanor liability and punishing responsible persons in legal entities (Law on Amendments to the Law on Misdemeanors against Public Order and Peace, Official Gazette 49/70). Six years later (1975), the legal text was amended again, which 'hybrid' defines the concept of a public order offense, combining the definitions from the laws of 1949 and 1969 (Art 1 of Law on Amendments to the Law on Misdemeanors against Public Order and Peace, Official Gazette, 11/75. The legal text restores the offense of witchcraft, in the case of the offense of insulting, it further emphasizes the then socialist system of the state, recognizes independent catering activities as an exception to the socialist system of economic activity, reintroduces the possibility of expulsion as a misdemeanor sanction, and introduces the authority to temporarily seize objects for police officers.

What was not laid down in the legal text itself was the possibility for local governments to impose offenses against public order and peace, but there was a constitutional authority for autonomous provinces to regulate the area of public order and peace. Thus, the Law on Misdemeanors against Public Order and Peace, Official Gazette APV, 10/76 was in force on the territory of Autonomous Province



of Vojvodina, and the Law on Public Order and Peace, Official Gazette APK, 13/81 was in force on the territory of Autonomous Province of Kosovo and Metohija, which remained in force until 1992.

Legal regulation of public order in Serbia after the change in the socio-political system

In the 1990s, the communist system of society and the state collapsed and changes occurred in the legal regulation of all parts of social life, including the area of public order and peace. Also, the Law on Public Order and Peace – ZJRM, Official Gazette 51/92 was adopted. The only significant change occurred in 2005 during the codification of criminal legislation, when the criminal offense named Obstructing an Authorized Official in the Performance of Security or Maintenance of Public Order and Peace from Article 24 was deleted from this legal text and incriminated by the Criminal Code.

The ZJRM deals only with the definition of public order and peace, while the definition of misdemeanors in the field of public order and public places is left to theory or other laws of the Serbian legal system. Public order and peace imply a harmonious state of mutual relations between citizens resulting from their behavior in public places and the actions of state bodies and organizations in public life. The goal of state bodies and organizations is to ensure equal conditions for the exercise of citizens' rights to personal and property security, peace and tranquility, private life, freedom of movement, the preservation of public morality and human dignity, and the right of minors to protection (Art. 2 of ZJRM).

At the very beginning, the ZJRM established a regime for the use of pyrotechnics and the collection of voluntary contributions, which included mandatory reporting to the police, with the possibility for the police to prohibit these activities if they endanger the (safety) peace of citizens or disrupt public order and peace (Art. 3-5 of ZJRM). Later provisions of the ZJRM regulated misdemeanors from minor ones (argument, shouting, threats, etc.) to more serious ones (fight, insolent and violent behavior, prostitution, begging, etc.) as well as one felony, Obstructing an Authorized Official in the Performance of Security Duties or Maintaining Public Order and Peace, from Art. 23 of this ZJRM (Art. 6-19). The ZJRM uses terms such as fight, quarrel, shouting, insolent behavior without defining these terms in more detail, but has left the freedom to legal theory and case law to define these behaviors. The liability of the parent/trustee is also foreseen if the offense committed is a consequence of his/her failure to exercise due supervision over the minor, provided that he/she was able to exercise such supervision (Art. 20 of ZJRM).

The sanctions prescribed for misdemeanors are penalties and protective measures. The penalties that could be imposed were a fine and imprisonment for a maximum of 60 days, and the protective measures were confiscation of objects and prohibition of performing activities. The police had the possibility of temporarily confiscating the objects of a misdemeanor while other procedural provisions were not issued (Art. 6-22 of ZJRM).

The development of society, law and legal science leads to inevitable changes in the field of public order and peace, so in 2016 the currently valid Law on Public Order and Peace, Official Gazette RS, 6/16 was adopted. In the text of the explanatory memorandum, the proposer of the law considered it necessary to define a public place and other terms (quarrel, fight, etc.) in order to remove certain doubts, for the law to recognize other state bodies whose task is to maintain order (communal militia) and for the field of public order and peace to be harmonized with the systemic law regulating substantive and procedural misdemeanor law (http://www.parlament.gov.rs/upload/archive/files/cir/pdf/predlozi_zakona/3710-15.pdf#page=16.09). The law has undergone only one amendment in the form of an increase in fines for misdemeanors under Art. 17, which refers to pyrotechnics and shooting from weapons.

The analysis of regulations identified the basic variables of the legal regulation of public order and peace, namely the existence of authority to regulate public order at the local level, the existence of pro-



visions regulating felonies against police officers, the liability of parents/trustees, and imprisonment for misdemeanors (Table 1).

Table 1: *Basic characteristics of Public Order and Peace Laws*

Laws	1949	1969	1975	1992	2015
Defining public order and peace	NO	NO	NO	YES	YES
Defining public place	NO	YES	NO	NO	YES
Defining public order misdemeanor	YES	YES	YES	NO	YES
Local level regulation of public order	YES ³	YES ⁴	YES ⁵	NO	NO
Felony against police officer	NO	NO	NO	YES	YES
Responsibility of parents/trustees	YES	YES	YES	YES	NO
Imprisonment for misdemeanors	YES	YES	YES	YES	YES

Public order and peace began to be defined in the 1990s, and this solution has been retained in the currently valid law with minimal changes. The definition of public order and peace in the currently valid law is more general than that of 1992, as it refers to the exercise of all human and minority rights and freedoms of citizens guaranteed by the Constitution. The 1992 definition listed individual freedoms and rights of citizens and singled out the right to personal and property security, the right to peace and tranquility, the right to private life, freedom of movement, the preservation of public morality and human dignity, and the right of minors to protection.

Defining public order and peace misdemeanors is traditional in Serbian legislation regulating the area of public order and peace. As can be concluded, the current definition uses the term ‘unlawful acts’, while in the past laws used the formulation ‘behavior or actions’ (Table 2).

Table 2: *Definition of Public Order and Peace Misdemeanors*

Law from 1949	Law from 1969	Law from 1975	Law from 2015
Behaviors or actions that disrupt the normal way of life of citizens, hinder movement and traffic on streets and other public places, create unrest among citizens, violate public morals, interfere with the proper use of public facilities and residential buildings, spend time in idleness, interfere with citizens’ rest or otherwise disrupt social discipline and peace of citizens	Behaviors or actions that endanger the safety of citizens, disrupt the unhindered movement of persons in public places, the use of public facilities, residential and other buildings, as well as the performance of official tasks of state bodies and working and other organizations that exercise public authority	Behavior or actions that disrupt the normal way of life of citizens, endanger their safety, disrupt the unhindered movement of persons in public places, create unrest among citizens, violate public morals, hinder the use of public facilities, residential and other buildings, hinder the work and performance of official tasks of state bodies and organizations of associated labor and other organizations that exercise public authority, or otherwise violate social discipline and peace of citizens in a manner contrary to the regulations	Unlawful acts that threaten or disrupt public order and peace in a public place, create disturbance or endanger the safety of citizens, hinder the movement of citizens in public places or the exercise of their rights and freedoms, offend morals, endanger the general safety of property, insult or obstruct officials or otherwise disrupt public order and peace

³ Until 1956

⁴ Only autonomous provinces

⁵ Only autonomous provinces



The maintenance of public order and peace has existed since the formation of the Serbian state (Table 3). After liberation from German occupation, the modern period of regulating the legal protection of public order and peace began, where the material and procedural aspects were emphasized. Each period of development of the legal regulation of the maintenance of order as a public service has its own specificities, but there are also certain similarities. For example, quarreling, insults, indecent behavior, as well as witchcraft, represent traditional misdemeanors against public order and peace in Serbia. Modern misdemeanors include arrogant and reckless behavior, noise in restaurants and other establishments, and the sale of alcoholic beverages to minors or drunken persons. In modern times, vagrancy is no longer classified as a misdemeanour.

Table 3: *Misdemeanors against Public Order and Peace in Serbia through history*

		Dušan's Code	Police Directive Act	Law from 1949	Law from 1969	Law on Amendments 1975	Law from 1992	Law from 2015
1.	Quarrel	*	*	*	*	*	*	*
2.	Indecent behavior	*	*	*	*	*	*	*
3.	Insulting	*	*	*	*	*	*	*
4.	Fight		*	*	*	*	*	*
5.	Insulting of officials	*	*	*	*	*	*	*
6.	Yelling		*	*	*	*	*	*
7.	Leaving dangerous items		*	*	*	*	*	*
8.	Vagrancy		*	*	*	*	*	
9.	Perpetration of violence	*	*		*	*	*	*
10.	Noise		*		*	*	*	*6
11.	Arrogant behavior			*	*	*	*	*
12.	Reckless behavior				*	*	*	*
13.	Selling alcoholic beverages to minors/drunken persons			*				*
14.	Gambling		*	*	*	*	*	*
15.	Prostitution		*	*	*	*	*	*
16.	Firing from weapons		*	*	*	*	*	*
17.	Witchcraft, fortune-telling or similar deception	*	*	*		*	*	*

CONCLUSION

For the purposes of this research, four periods in the development of legal protection of public order were identified: the Middle Ages, the period after liberation from the Turkish occupation, the period after World War II, and the modern period.

Public order and peace as a social and legal phenomenon began to be defined in law only in 1992, while the definition of a public place appeared in the law from 1969 and exists in the currently valid law. It can be concluded that defining misdemeanours against public order is a traditional legal practice in Serbia, except for 1992 when a departure from this tradition is identified. Decentralization in



the field of regulating public order and peace was observed in the past, but since 1992 this legal practice has been abandoned and local governments are not given the opportunity to regulate misdemeanors against public order and peace. The regulation of felonies to the detriment of police officers began only in 1992, while the liability of parents/trustees existed until 2015, when this system of objective liability was abandoned. Prison sentences have always been issued for more serious misdemeanors against public order and peace.

The 2015 law makes a public place an essential element of a public order and peace misdemeanor, which is why it is defined by law. This is not the first time that this has been done, as we can see that the 1969 law also had a definition of a public place, with the difference that it was very detailed, while the 2015 definition is more general, but they do not differ in essence.

Through substantive law, misdemeanor actions were imposed and certain segments that were important for the area of public order and peace were defined at that time (public place, public order and peace, or misdemeanors against public order and peace). The procedural part of the legislation regulated certain actions of state bodies, primarily the police, which had as their ultimate goal the maintenance of public order (and peace) as a part of policing.

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DISSOLUTION OF ETA AND CONTINUATION OF THE STRUGGLE OF SPANISH INSTITUTIONS IN THE AREA OF JUSTICE SYSTEM

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ABSTRACT

Purpose: The purpose of this paper is to enable an overview of the new situation in Spain regarding the decision of ETA's leaders to stop with armed struggle and activities of institutions in Spain to continue with persecution and prosecuting members of ETA who committed crimes.

Design/Methods/Approach: Deductive-inductive and analytical methods are the main methods that will be used in the paper, which will enable understanding of the whole process from ETA's first actions to its decision to stop with violent activities, as well as decisions and actions of Spanish institutions to continue law-enforcement efforts related to committed acts of ETA's members in the past.

Findings: Our findings focus on better understanding the nature of ETA as an organization and committed terrorist acts, but more importantly politics and methods which institutions in Spain are using in order to satisfy justice regarding criminal acts committed by ETA members in the past.

Originality/Value: ETA was a terrorist organization that several decades conducted armed struggle through terrorist acts with the goal of giving Basque region independence. Still, ETA gave up armed struggle and disbanded in 2018, but Spanish institutions have still not given up on finding and prosecuting ETA members who were involved in terrorist acts. ETA and the work of Spanish institutions will be analyzed through ETA's organization and functioning, as well as through policy which Spanish institutions adopted after ETA was disbanded. The subject of the research is ideological terrorist organization that used certain methods in order to fulfil its goals and whose dissolution positively influenced the political and social stability in Spain. Also, an important part of the paper is presentation of the activities and measures of Spanish institutions in the area of law-enforcement whose goal is to bring perpetrators of criminal acts to justice. The goal of these institutions is satisfaction of justice and respect for the laws that existed at the time of committing terrorist and other violent acts.

Keywords: ETA, terrorism, Spain, law enforcement, justice system, institutions

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INTRODUCTION

For several decades, Spain faced terrorist attacks. These attacks were carried out by a terrorist organization called *Euskadi Ta Askatasuna*, abbreviated as ETA. This organization changed over the years both internally and in terms of how it carried out terrorist activities. Initially, ETA was merely a nationalist organization that sought independence for the Basque Country. Later, ETA adopted certain leftist principles. Eventually, the leftist faction prevailed within ETA, and the organization took on a Marxist-Leninist character. In its operations, ETA also relied on some political parties that shared its goal—namely, the secession of the Basque Country from Spain. At the beginning of its activities, ETA had significant support from the population in the Basque region. However, after several terrorist acts, this public support declined. Another factor that contributed to the weakening of ETA as an organization was the arrest of its leadership in France. Over time, ETA weakened more than it grew stronger as a terrorist organization. Spain's democratization also played a significant role in this decline. As a result of democratization, the autonomous region of the Basque Country was established, the use of the Basque language was permitted, and freedom of expression was granted. When it lost its most important support, ETA decided to cease armed actions, which marked the organization's disbandment. Spain utilized several overlapping and mutually supporting strategies to effectively fight against ETA. It designated ETA as a terrorist organization and created special centralized institutions and legal frameworks to fight against it. In this fight it relied on cross-border cooperation with French



authorities. Furthermore, it enacted special legislation to suppress activities related only indirectly to ETA's actions intended to cut short its financial revenues, constitutional legitimacy and ideological appeal. The results were mixed at best, and will be analyzed in two separate subsections of this article.

THE ORIGIN AND DEVELOPMENT OF ETA

When considering the political spectrum in the Basque Country, the Basque political left (Izquierda Abertzale) is the political space where the greatest number of acronyms has emerged. Among them were Herri Batasuna, Euskal Herritarrok, Batasuna and Acción Nacionalista Vasca (ANV). Since the founding of the organization Basque Country and Freedom (Euskadi ta Askatasuna – ETA) in 1959, there have been more than ten armed organizations and over twenty political acronyms that could be associated with this political space. Some existed only briefly, while others still exist today. Many terms are used to refer to the political sphere connected with the Basque political left, but three names are most commonly used: radical Basque nationalism, the Basque political left, and the Basque National Liberation Movement (Movimiento de Liberación Nacional Vasco – MLNV). Under the MLNV there were series of organizations grouped together. This made stronger civil infrastructure which ensured ETA's continuity (Martín-Peña, J., Rodríguez-Carballeira, Á., Escartín Solanelles, J., Porrúa García, C. and Willem Winkel, F., 2010: 113). Mentioned three terms may appear identical, but they do not mean the same thing. Radical Basque nationalism is the broadest term and refers to ultra-nationalism that seeks the independence of the Basque Country. Radical Basque nationalism does not necessarily have to be linked to ETA or to leftist movements. A clear example is the split from the Basque Nationalist Party (Partido Nacionalista Vasco – PNV), which led to the creation of Homeland (Aberri) and Position (Jagi-Jagi), an event that occurred in the 1930s.

An organization called Basque Solidarity (Eusko Alkartasuna – EA) has, on several occasions, been associated with the sphere of the Basque political left. Also, some factions within the PNV cannot be considered radical nationalists. However, it can be argued that other radical nationalists share only the same goal—namely, the independence of the Basque Country—but not the use of violence, which was employed by ETA. Some segments of the radical left associated with the PNV do use violence as a means to achieve their aims.

A term such as the Basque political left is specific and refers to a national program that emerged in the 1950s. Initially, the only organization of the Basque political left was ETA. It should be emphasized that what all organizations of the Basque political left have in common is that they originated from ETA. Although they share the same political goals—namely independence and socialism—not all organizations of the Basque political left used the same methods, nor were they always cohesive. Two key differences existed among them. The first was the use of violence as a means. The second difference concerned the direction of their activity: one orientation was focused on a leftist system, while the other was directed toward patriotism.

Most restrictive term is MLNV, which refers to the socio-political network that emerged during the transition period when ETA's militarist wing was taking shape. The MLNV is a complex movement that encompasses one or more political forces, labor organizations, and groups dealing with various social issues. Their common denominator is the patriotic and social project of ETA, which represents the core of the movement. In addition to the goals it shares with the Basque political left, the MLNV supported ETA's use of violent methods. The MLNV organized itself into several circles. The core of the organization—or the movement—consisted of militant individuals within ETA, while the other circles were made up of sympathizers who were active only during major events. The sum of these circles, ranging from the least to the most militant individuals, formed a parallel society within the



Basque Country, one that had its own customs, means of communication, socialization patterns, and recreational networks (Leonisio, 2015: 83-85).

It should be noted that until 2014 under the MLNV there were around 10 armed organizations and around 20 political acronyms. Regarding political acronyms there were different political forces, labour unions and groups associated with various political issues like feminists, students, youth, pro-amnesty groups and similar (Leonisio, 2015: 85).

ETA, which was an armed organization from the Basque Country, was founded at the end of July 1959. ETA was set up by Basque students who worked on *EKIN* journal. Their motivation was the passivity of the leaders of traditional nationalism, represented by the Euzko Alderdi Jeltzalea/Partido Nacionalista Vasco (EAJ/PNV). In July 1959 members of *EKIN* abandoned EAJ/PNV youth organization and formed ETA (Pestana Barros, 2010: 402). After 60 years of fighting against the Spanish state, with the goal of establishing a socialist Basque state, ETA was disbanded in early May 2018. Although it was founded in 1959, it was only five years later, in 1964, that ETA began using explosive devices. These devices were used at the time to mark the Franco dictatorship. During its 60 years of active operations, ETA caused more than 800 deaths (Guibet Lafaye and Brochard, 2022: 1-2). ETA was the oldest terrorist organization in Europe and one of the oldest in the world. As already mentioned, ETA was formed in 1959, but it only began carrying out killings in 1968 (Sánchez-Cuenca, 2009: 610).

The Basque Autonomous Community enjoys a high level of autonomy within Spain. Over the past 45 years, this status has been overshadowed by the actions of the terrorist organization ETA and the violence it caused. Through this, ETA aimed to draw attention to the Basque issue in two ways: first, by highlighting the differences among the Basques themselves, and second, by emphasizing the distinction between the Basque Country and Madrid—specifically, the differences in the relationship between the Basque provinces and the central government of Spain. Political life in the Basque Country is marked by polarization and political pluralism. At first glance, political divisions within the region are primarily based on the divide between nationalists and non-nationalists. Still, there was Basque pro-independence left too which, as already mentioned, consisted of Herri Batasuna, Euskal Herritarrok, Batasuna and Acción Nacionalista Vasca (ANV). These divisions reflect significant differences in views on Basque identity, the Basque language, social class, rural vs. urban origins, and the diversity of Basque political parties. In recent decades, the non-nationalist population has supported political changes that led to regional autonomy, a result of Spain's democratic processes. Modern Basque nationalists, united around the EAJ/PNV, which has led the regional Basque government since 1980, except for the period between 2009 and 2013, have insisted on the right to self-determination. This self-determination was meant to include the option of voting for full independence from Spain. Radical nationalists, part of the left-wing movement aligned with ETA's ideology, demanded full independence for the Basque Country and for years supported, or at least failed to condemn, the violence ETA used in pursuit of that goal. ETA advocated for an independent socialist Basque state that would span territories in both Spain and France. Due to decentralization in both Spain and France, the Basque territory is divided into seven administrative regions—four in Spain and three in France. After the death of General Franco in 1975, members of the EAJ/PNV reluctantly accepted the creation of the Basque Autonomous Community within Spain (Whitfield, 2015: 2-3).

ETA emerged as a national security movement in response to Franco's dictatorship, which also extended to the territory of the Basque Country. With the end of the dictatorship, ETA initiated a war of attrition against the Spanish state. Its goal was the creation of an independent Basque Country. The violence carried out by ETA was supported by several organizations united under MLNV. Over time, this civilian wing of ETA grew stronger and provided the infrastructure that enabled ETA to exist and operate. This network consisted of individuals who were collaborators and sympathizers of ETA



(Martín-Peña, Rodríguez-Carballeira, Escartín Solanelles, Porrúa García and Willem Winkel, 2010: 113). There were two main factors that influenced the formation of ETA. The first was the perception of the Basque Country as an occupied state, and the second was Franco's rule. The founders of ETA believed that Franco's regime made the idea of occupation a concrete reality. From the very beginning, ETA consistently promoted two core ideas: the independence of the Basque Country and the use of violent actions. Although ETA did not officially declare itself a socialist organization, it advocated for certain social changes, including a deep transformation of property ownership and the socialization of industrial resources in key economic sectors. Before holding its first official assembly, during which these proposals were formally presented, ETA carried out its first act of violence. The organization attempted to attack a train full of Franco supporters, but the attack failed. The authorities responded forcefully, and many of ETA's key members fled Spain and took refuge in France (Leonisio, 2015: 86-87). The Spanish law-enforcement in its response could rely on cooperation with law enforcements of other states within the TREVI network (Jazić, 2025: 24). While in exile in France, members of ETA became more deeply acquainted with leftist ideologies. This exposure enabled them to reconcile and integrate nationalism with Marxist influences. Over time, nationalism, Marxism, and anti-colonialism became core components of ETA's ideology. However, the leftist faction within ETA was viewed with a degree of suspicion by other members. It was believed that they were overly committed to leftist ideas compared to the nationalists. ETA's second assembly, held in 1963, marked a significant ideological shift: the principles of revolutionary warfare were officially adopted, and a workers' front was established in response to growing concern over social issues. At this point, ETA formally became a leftist organization. The third assembly, held in 1964, pushed ETA even further in its anti-colonial stance, which may have contributed to the eventual split with the EAJ/PNV. ETA criticized the EAJ/PNV's nationalism as bourgeois, in contrast to its own working-class-based nationalism. The fourth assembly in 1965 saw two dominant ideological tendencies emerge: a pro-worker and an anti-colonial line. The fifth assembly, held in 1967, did not bring ideological changes; the organization's goals remained national and social liberation, to be achieved through armed struggle. However, the ethnolinguistic faction within ETA chose to leave the organization for two main reasons. First, ETA's plan to initiate large-scale armed actions. Second, the increasingly dominant influence of Marxist ideology in shaping future activities and operations. Those who left argued that ETA had ceased to be an organization accommodating diverse ideological tendencies and had instead become a group with a clear Marxist-Leninist orientation. That moment marked the division of ETA into two wings — the militarist wing and the politico-militarist wing. After separating from ETA, they established connections through the publication *Branka*. By doing so, they aimed to become a pressure group intended to influence the development of political activities associated with ETA. This group sought to steer ETA toward nationalism and away from leftist positions (Leonisio, 2015: 87-90).

There were two key ideological aspects that contributed to the emergence of ETA. The first was a nationalist doctrine that viewed the Basque Country as an occupied territory. The second was the dictatorship of General Franco, which reinforced this sense of occupation. The nationalist doctrine was rooted in a myth of a time when all Basques were equal and independent, until they were occupied by Spain and France. Franco's repressive measures, such as the suppression of political pluralism, the ban on the Basque language, and the restriction of freedom of expression, only intensified the sense of threat. These actions fueled nationalism in the Basque region and accelerated the formation of ETA. ETA's ideology was a blend of Marxism-Leninism and nationalism. The Spanish capitalist system was seen as hostile, as ETA members believed that the capitalist class in the Basque Country was allied with the central Spanish authorities. According to ETA, Basque capitalists contributed to the erosion of Basque cultural identity, while the Basque proletariat were seen as the true bearers of that identity. ETA justified its use of violence on three grounds. First, violence was seen as legitimate and inevitable



in the struggle for national liberation. Second, violence was perceived as a tool to reinforce Basque ethnic identity, strengthening a sense of belonging and resistance. Third, Violence fostered internal solidarity and group cohesion among ETA members and supporters (Scott and Dr. Hess, 2024: 17-18).

Some coordination inside ETA was necessary. This task was carried out by Patriotic Socialist Coordination (KAS) formed in 1976. KAS was inter-organizational coordinating body. The task of KAS was to help political wing of ETA to cope with repercussions of Spanish state (Duhart, 2016: 48).

ARMED ACTIONS AND DISBANDMENT

Under a dictatorship, repression is very strong. Such conditions discourage potential insurgents, and the result is the absence of violent protests and actions. In consolidated democracies, repression is not strong, which means that the existing political conditions allow for peaceful political actions. When a regime is in transition, state authorities lose part of their repressive power, so the rights that enable peaceful political protests are not fully prioritized. When political protests arise during the transition process, they can easily become violent. Accordingly, ETA's major offensive began in 1977 and decreased in 1981. This very intense cycle of violence took place during the transition to democracy. The transition period occurred between Franco's death and the conclusion of the 1981 elections (Sánchez-Cuenca, 2009: 622).

There were four phases in ETA's armed actions. *The first phase* began at the end of 1973 with the assassination of Carrero Blanco and two of his bodyguards. This phase ended with the first democratic elections in mid-1977. During this period, the level of violence by ETA remained relatively low. Despite the revolutionary messages sent by ETA, the Basque population did not pay much attention to them at the time. *The second phase* started at the end of 1977, following the celebration of the first democratic elections. This phase can be seen as a war of attrition against the Spanish state. ETA no longer expected to mobilize large masses of people through its actions. Instead, ETA decided to use violence as a means to harm the Spanish state in retaliation for its refusal to meet ETA's demands. These demands included the right to self-determination, the withdrawal of Spanish military and police forces from the Basque territory, and full amnesty for ETA members. Large-scale ETA operations that began in 1977 lasted until the end of 1980. *The third phase* lasted from 1982 to 1992 and was characterized by relative stability in the number of fatalities caused by ETA's activities. However, there were individual periods with spikes in deaths, notably in mid-1987 and mid-1991, when ETA caused numerous fatalities by planting explosives in cars during separate attacks. This phase ended in late March 1992, when ETA leaders were arrested in southern France (Sánchez-Cuenca, 2009: 612-615). During this phase, the organs of the Spanish state established the Anti-Terrorist Liberation Groups (Grupos Antiterroristas de Liberación – GAL). This occurred under the government led by Felipe González. These were paramilitary formations intended to fight against ETA. GAL was composed of mercenaries from France and Portugal. The organization operated between 1983 and 1987. GAL was involved in executions, bomb attacks, and kidnappings in the Basque region and southwestern France. The result was 27 people killed, including key ETA leaders. However, there were also many victims who had no connection with ETA. The activities of GAL had no significant effect on the functioning of ETA. GAL was disbanded in 1986. Its existence and operations had a negative impact, particularly regarding the reputation of the Spanish authorities. More specifically, it created the image that Spain's democratic system was violent and repressive toward the population of the Basque Country (Scott and Dr. Hess, 2024: 23). *The fourth phase* began with these arrests, which disrupted ETA's plans for attacks on Spanish territory, especially as Spain was then hosting major international events like the Barcelona Olympic Games and the Seville Expo. ETA's goal during these events was to put maximum pressure



on the Spanish state. Still, Spanish police thwarted these plans with arrests in Bidart. After the arrests, ETA never regained the strength it had before (Sánchez-Cuenca, 2009: 615).

Recognizing that armed struggle alone could not secure independence from Spain, ETA began co-operating with nationalist political parties. During this phase, ETA also changed its choice of targets. Until 1992, violence was primarily aimed at putting pressure on the Spanish state by attacking police, the Civil Guard, and the military. After the arrests of key leaders, the focus shifted to state representatives and government officials. This change was motivated by two reasons. The first reason was that attacks on state officials were believed to have a greater impact on public opinion than attacks on security forces. The second reason was attacks on non-nationalist politicians were useful for the nationalist front's strategy because they deepened divisions within the Basque Country between nationalists and non-nationalists. ETA declared a ceasefire at the end of 1999, but this ceasefire was short-lived. Armed activities resumed mainly between late 2000 and mid-2001, but were quickly suppressed by Spanish security services. From 2003 onwards, ETA's armed activities were carried out with very low intensity (Sánchez-Cuenca, 2009: 615-616).

The violence carried out by ETA can be divided into physical and psychological violence, although it often happened that people experienced psychological violence before physical violence. ETA conducted physical violence throughout the entire territory of Spain, including the Basque Country, while psychological violence was primarily carried out within the Basque region. Physical violence included assassinations, bombings, and similar acts. Through its violence, ETA created a constant sense of threat in the Basque Country, aiming to establish an atmosphere of fear. This situation allowed ETA to persecute certain individuals, isolate them, and mark them negatively. Additionally, ETA extorted money from businesspeople and threatened small entrepreneurs and liberal professionals. The strategies of psychological violence had significant consequences on the health of those exposed to it and their surroundings. Individuals subjected to psychological violence developed various forms of psychological disorders and illnesses, which significantly altered their daily lives (Martín-Peña, Rodríguez-Carballeira, Escartín Solanelles, Porrúa García and Willem Winkel, 2010: 113). It should be emphasized that ETA used only conventional armed means in its activities. It is known that terrorist groups also use biological weapons (Stevanović, Kekić, and Miladinović, 2011: 306–318). However, ETA did not use this type of weapon.

Over time, changes occurred within the Basque patriotic left, leading to a division into two factions. The first faction was ETA, which advocated for political-armed struggle, while the second faction supported purely armed struggle. The militarist wing did not change its fundamental principles. On the other hand, the political-militarist wing gradually moved away from armed struggle and maximalist goals. This political-militarist wing showed interest in autonomy within Spain and shifted towards more modern leftist positions. However, in mid-1977, the political-militarist and militarist wings of ETA reunited. This merger strengthened militarism within ETA. The union of the two wings created a powerful organization capable of provoking significant political reforms. ETA thus had two main tasks: the political-militarist wing protected the political struggle, ensuring the achievement of popular goals, while the militarist wing engaged in direct conflict with state authorities. This conflict was meant to be a war of attrition aimed at forcing the Spanish state to accept ETA's demands (Leonisio, 2015: 94-95).

During its activities, ETA caused over 800 deaths, as well as many injuries, kidnappings, coercions, material damages, and similar incidents. ETA is uniquely characterized as an organization that generalizes the results related to the number of victims caused. The large number of victims, most of whom were not nationalists, caused over a long period has one important precondition: it concerns the social support that ETA had in villages and towns (Varona, Luis de la Cuesta, and Echeburúa, 2016: 66-68). By July 2011, members of the EAJ/PNV who were negotiating with ETA members had



achieved all they could without the participation of the central Spanish authorities. At that moment, ETA was weakened and ready to cease armed struggle but demanded guarantees from the Spanish central government. These guarantees included the legalization of the Basque Socialist political party (SORTU) and better conditions for about 700 arrested ETA members. Moving towards finding a solution required a peace process that would not directly include the Spanish authorities but would involve communication. This communication took place between the nationalist left, ETA, and the Spanish government through trusted intermediaries. The Spanish government released ill former ETA members, while the nationalist left in October 2011 dissolved Ekin. Members of Ekin were a hard-line group which played the role of political commissars of ETA within MLNV. Also, this new Ekin group, which was formed in 1999, was considered as the successor of KAS, because it replaced KAS as coordinating body of the movement (Duhart: 2016, 50). Afterwards, on October 17, 2011, an international conference was held in San Sebastián. A few days after the conference ended, ETA officially announced it was ending its armed activities (Whitfield, 2015: 9-10).

LEGAL TOOLS EMPLOYED BY SPAIN TO FIGHT AGAINST ETA – DIRECT LEGAL TOOLS

Designation of the ETA as a Terrorist Organization

The prosecution of the Basque separatist organization ETA was a long and complex process carried out primarily by the Spanish and French governments. It relied heavily on the use of counter-terrorism laws and judicial mechanisms to dismantle the group and its support networks. ETA was officially designated as a terrorist group by Spain, France, the European Union, the United States, and others. This classification was crucial as it provided the legal basis for applying specific counter-terrorism laws, which often entailed stricter penalties and special procedures. The terrorist designation was justified in ETA's bloody practice of brutal indiscriminate attacks on the civilian population and on public officials, especially through bombing attacks. The estimates of ETA's almost five decades long path of terror put the number of casualties to around 800 people killed, 2500 wounded and 80 kidnapped (Petrović, 2022).

Institutional Centralization and Specialization of the Fight against Terrorism

In Spain, the legal fight against ETA was led by the *Audiencia Nacional* (National High Court). This special court was established in 1977 and has jurisdiction over crimes related to armed groups and terrorism. The court handled the investigation and trial of ETA members for a wide range of offenses, including murder, attempted murder, kidnapping, extortion, and belonging to a terrorist organization (Duhart, 2025: 725). Spain's legal system for prosecuting terrorism is highly centralized, with a single national court holding jurisdiction. The *Audiencia Nacional* is a special, centralized court with nationwide jurisdiction over major crimes, including terrorism, organized crime, and money laundering. It was created in 1977, in the final years of Spain's transition to democracy, to handle the most serious crimes affecting national security. The *Audiencia Nacional* has an investigative branch, the Central Instruction Courts, and a Criminal Chamber that tries cases. By assigning all terrorism cases to the *Audiencia Nacional*, Spain aimed to ensure consistency and expertise in the prosecution of these complex crimes. This centralization also allows for a unified response to a threat that often transcends regional borders (Varona, 2013: 218).



Comprehensive Legal Framework

Spain has developed a comprehensive legal framework to combat terrorism, which has been shaped by its long history with groups like ETA. This framework is characterized by a strong judicial and police response and is based on a number of key laws and specialized institutions. The core of Spain's anti-terrorism legislation is found in the Organic Law 10/1995, which is the Spanish Criminal Code (Penal Code (Organic Law No. 10/1995 of November 23, 1995, as amended up to Organic Law No. 2/2019 of March 1, 2019)). It contains specific articles that define and criminalize various aspects of terrorism. The law defines terrorism not just by the act itself (e.g., bombing, murder) but also by the purpose of the act—to “subvert the constitutional order or seriously alter public peace.” According to the Human Rights Watch report, this broad definition allows for the prosecution of individuals who may not be directly involved in violent acts but are part of a larger terrorist group or organization (HRW, 2024). The legal principle behind this is that the existence of a terrorist group itself is a threat to public order and national security. Therefore, any activity that contributes to the group's operation and goals is considered a crime, even if it doesn't involve direct violence. This is a common feature of modern counter-terrorism legislation in many countries, reflecting the shift from a focus on individual acts of violence to a more holistic approach of disrupting and dismantling entire terrorist networks (Galli, Mitsilegas & Walker, 2016).

The Criminal Code establishes a catalog of offenses with severe penalties. These include:

- 1) Membership in a terrorist organization and collaboration with a terrorist group.
- 2) Specific terrorist crimes, such as murder, kidnapping, and arson, which carry much higher penalties when committed for a terrorist purpose.
- 3) Financing of terrorism.
- 4) Apology for or glorification of terrorism (*apología del terrorismo*). This provision has been used to prosecute individuals who praise terrorist acts or their perpetrators, and it has been a subject of controversy and legal debate (Vučić, 2021). We will revisit this issue further down in the text.
- 5) Enhanced Penalties: The law often establishes aggravated penalties for crimes when they are committed by members of, or in collaboration with, a terrorist group.

Special Criminal Procedural Measures

To aid in the prosecution of terrorism cases, Spanish law allowed for certain special measures. For example, terrorism suspects could be held in police custody for up to five days (instead of the standard 72 hours) before being brought before a judge. This special measure is established in the *Ley de Enjuiciamiento Criminal (LEC)*, Spain's Code of Criminal Procedure, and is constitutionally permissible under Article 55(2) of the Spanish Constitution. While these measures were intended to be a necessary tool for fighting terrorism, they were also criticized by human rights organizations for potentially facilitating mistreatment or torture of detainees. European Committee for the Prevention of Torture (CPT), a body of the Council of Europe, has consistently recommended that Spain abolish its *incommunicado* detention regime. In its reports following periodic visits to Spain, the CPT has noted that while the number of cases of alleged ill-treatment has decreased, the “intrinsic potential for ill-treatment” of suspects under such a regime remains a significant concern (CPT, 2025). The CPT has also expressed concern over allegations of excessive use of force upon apprehension and during detention. European Court of Human Rights (ECtHR) has ruled against Spain in numerous cases for failing to conduct effective investigations into allegations of torture and ill-treatment, particularly in cases involving *incommunicado* detention (*Case of Otamendi Egiguren v. Spain*, 47303/08, Judgment (Mer-



its and Just Satisfaction), Court (Third Section), 16/10/2012; *Case of Arratibel Garciandia v. Spain*, 58488/13, Judgment (Merits and Just Satisfaction), Court (Third Section), 05/05/2015; *Case of Portu Juanenea And Sarasola Yarzabal v. Spain*, 1653/13, Judgment (Merits and Just Satisfaction), Court (Third Section), 13/02/2018). The court has repeatedly found that the lack of legal safeguards—such as access to a lawyer of one's choosing and independent medical examination—makes it difficult for detainees to prove mistreatment. The court's judgments have underlined that *incommunicado* detention places a special burden on the state to protect detainees.

The regime of *incommunicado* detention represents a sharp conflict between the state's claimed need for exceptional security measures and the fundamental human rights of the detainee. The Spanish government consistently defended the regime as a necessary and exceptional operational measure in complex anti-terrorism investigations. The stated goal was to prevent the destruction of evidence, for example to stop the detainee from alerting co-conspirators who could destroy evidence or flee, or to obtain critical information, that is to secure intelligence needed to prevent imminent attacks and dismantle a terrorist network quickly (Ubasart-González, 2013). In essence, the Spanish government saw *incommunicado* detention as a pragmatic tool of national security—a necessary evil to fight a highly organized and existential threat—while human rights organizations and critics saw it as an unacceptable violation of due process that created a systemic risk of torture. The international and domestic debate over the regime persisted for decades until its use was largely curtailed by a 2015 reform of the Criminal Procedure Act, partly due to a reduction in the ETA threat and rulings from the European Court of Human Rights.

Cross-border Cooperation in Criminal and Intelligence Matters

The French-Spanish cooperation was essential and ultimately decisive in the defeat of the terrorist group ETA. It transformed from a strained relationship into a model of cross-border counter-terrorism, culminating in the complete dismantlement of ETA's operational and logistical capacity.

Spanish and French security forces conducted numerous arrests of ETA members and leaders, often in coordinated operations. In later years, arrests in France became particularly significant, as the country had historically been a place of refuge for some ETA members (Stewart, 2009). Once arrested and convicted, the Spanish government pursued a policy of dispersal of Basque prisoners, scattering them in prisons across Spain and even in other countries (Stewart, 2009). The purpose of this policy was to break communication between ETA's leadership and its members, hindering the organization's ability to operate.

However, things were not so smooth at the beginning. For decades, especially during the Franco dictatorship, France adopted a policy of relative tolerance toward Basque exiles. The French Basque Country (*Iparralde*) became a crucial "sanctuary" where ETA members could reside, plan attacks, and train, largely untouched by the French authorities. France viewed the conflict as a Spanish domestic problem and was reluctant to cooperate fully, especially concerning the extradition of individuals who were considered political refugees. Cooperation began to seriously increase from the mid-1980s, driven by judicial and political shifts. France's shift was influenced by Spain's democratic transition, the realization that ETA was an organized crime and terrorist problem, not just a political issue and the growing use of French territory for logistical support and arms caches. France began extraditing ETA members to Spain, a process that became routine and significantly disrupted the group's leadership. After 2000, particularly post-9/11, the fight against terrorism became a global priority. France and Spain achieved full integration of their police and judicial efforts against ETA, making the French side of the border an extension of the Spanish security perimeter. Cross-border collaboration became seamless, leading



to the capture of nearly every major ETA leader, or *jefe militar*, who had sought refuge in France. This cut off the organization's chain of command.

The cooperation continued even after the ETA's dissolution. Thus, for example, in 2019, one of the most significant and long-sought fugitives, Jose Antonio Urrutikoetxea Bengoetxea, better known as Josu Ternera, was arrested in the French Alps. The Spanish Interior Ministry confirmed that the arrest was the result of a joint operation with France's DGSI, proving the continued effectiveness of the co-operation even after ETA's formal dissolution (Lopez-Fonseca, 2019).

INDIRECT LEGAL TOOLS

Constitutional Ban on Political and Social Support Structures

Prosecution extended beyond ETA's armed members to its political and social support structures. Spain's "Political Parties Law" of 2002 was a key tool in this effort. The 2002 law allowed for the judicial dissolution of political parties that were found to violate "democratic principles" by, among other things, "assisting and giving political support to terrorist organizations" (Ley Orgánica 6/2002, de 27 de junio, de Partidos Políticos, (Organic Law 6/2002, of June 27, on Political Parties), Boletín Oficial del Estado, BOE-A-2002-12756). The law specifically targeted parties that used violence to achieve political goals, promoted hatred, or sought to undermine the democratic system. This law led to the banning of political parties and organizations deemed to have links to ETA, most notably the political party *Batasuna* (Turano, 2003). Courts found that these entities were part of ETA's overall structure, and their members were prosecuted for collaborating with a terrorist organization. In its decision, the Supreme Court meticulously detailed the evidence proving that these political entities were not independent organizations but were, in fact, "fundamentally indistinct from each other and from the terrorist organisation ETA." While controversial, the law was later upheld by the Spanish Constitutional Court and the European Court of Human Rights, which recognized that the measure was a necessary and proportionate response to a pressing social need in a democratic society (ECHR, Zahev broj: 25803/04 i 25817/04, Herri Batasuna i Batasuna protiv Španije, 30. jun 2009).

Special Legislation on Terrorism Financing

Spain has also adopted specific legislation to prevent and freeze funds suspected of being used for terrorist activities. This aligns with international efforts to cut off the financial resources of terrorist groups (United Nations, International Convention for the Suppression of the Financing of Terrorism, 1999). Organic Law 12/2003, of 21 May, on the Prevention and Freezing of Terrorist Financing was one of the first specific pieces of legislation in Spain designed to freeze and prevent funds from reaching terrorist organizations. It gave state authorities the power to freeze funds suspected of being used for terrorist activities and permitted the examination and blockade of banking transactions.

Law 10/2010, of April 28, on the prevention of money laundering and terrorist financing is a comprehensive and more recent piece of legislation that consolidated and updated Spain's legal framework to align with European Union directives and international standards. It defines and criminalizes the financing of terrorism, which includes providing, collecting, or distributing funds with the knowledge or intention that they will be used for terrorist acts. Furthermore, it establishes obligations for "obliged subjects," such as financial institutions, lawyers, and real estate agents, to report suspicious transactions to the Spanish financial intelligence unit, *SEPBLAC*. Finally, it sets out penalties for non-compliance, including administrative and criminal sanctions.



The difference between Law 12/2003 and Law 10/2010 in the context of the fight against terrorist financing, specifically concerning ETA, represents a shift from a narrow, reaction-based focus to a broad, consolidated preventive regime. While both laws served as critical tools against ETA's financial infrastructure (including extortion, "revolutionary tax," and fraud), their legal nature and scope were fundamentally different. Law 12/2003 focused specifically on the immediate blocking (freezing) of funds and assets linked to terrorist groups, primarily in response to the rise of international terrorism post-9/11 and to supplement efforts against ETA, while the Law 10/2010 consolidated all anti-money laundering (AML) and counter-terrorist financing (CFT) obligations into a single, comprehensive legal framework, harmonizing Spanish law with the Third EU Anti-Money Laundering Directive.

Law 12/2003 remains in force after the adoption of the Law 10/2010, but with a narrower scope. Law 10/2010 stripped Law 12/2003 of its preventive content and re-named it the "Law on the Blocking of Terrorist Financing," leaving it focused almost exclusively on the administrative freezing of funds, while it itself became the current and primary law governing all anti-money laundering and counter-terrorist financing obligations in Spain.

Financial Action Task Force (FATF), an inter-governmental body that sets international standards to combat money laundering and terrorist financing, has repeatedly evaluated Spain's legal framework. Their reports, such as the 2014 and follow-up assessments, confirm that Spain has a robust legal system that is largely compliant with international standards (FATF, 2014). These reports specifically mention that Spain has strong legal measures in place, although they have, at times, pointed out areas for improvement, such as the need for faster implementation of targeted financial sanctions.

Criminalization of Terrorism Apology or Glorification

The provision criminalizing the "apology for or glorification of terrorism" is a key part of Spain's counter-terrorism legal framework, and it has indeed been a major subject of controversy and legal debate, particularly concerning its impact on freedom of expression. The legal basis for this is Article 578 of the Spanish Criminal Code, which makes it a crime to "glorify terrorism or humiliate victims of terrorist crimes." This provision was initially aimed at groups like ETA, but its scope was broadened, particularly in a 2015 amendment, to address new threats, notably the use of social media for extremist propaganda. The law does not require the act to directly incite a terrorist attack. Instead, it punishes the public glorification or humiliation itself.

The law has been used to prosecute numerous individuals, including artists, rappers, social media users, and most importantly, Basque politicians, for things they wrote or said. Some of the most well-known cases include rapper Valtonyc, convicted for lyrics that were deemed to glorify ETA and other groups and for insulting the monarchy (Bekaert, 2020); rapper Pablo Hasél, sentenced to prison for lyrics and tweets that glorified terrorism and insulted the monarchy (Gómez-Aller, 2021); and student Cassandra Vera, given a suspended prison sentence for a series of jokes she made on Twitter about the 1973 assassination of a Franco-era prime minister by ETA (Spanish Supreme Court, *The State v. Cassandra Vera*, February 26, 2018, Decision, STC 493/2018). The European Court of Human Rights later upheld Hasél's conviction in the case of *Rivadulla Duró v. Spain*, finding that the conviction was a proportionate limitation on his freedom of expression given the context of glorifying violence (EctHR, *Rivadulla Duró v. Spain (The Case of Pablo Hasél)*, 27925/21, Judgment, November 9, 2023).

Two cases deserve special attention since they both involved Spanish courts convicting Basque separatist politicians under anti-terrorism or related laws for public statements, which the European Court of Human Rights ultimately found to be disproportionate interferences with their right to freedom of expression under Article 10 of the Convention.



In the case of *Erkizia Almandoz v. Spain* (Application no. 5869/17), the applicant, a former Basque separatist politician, was convicted in Spain of condoning terrorism for his participation as the main speaker at an event organized to pay tribute to a deceased former member of the ETA terrorist organization. He received a one-year prison sentence and was disqualified from holding public office. The ECtHR found a violation of Article 10 (freedom of expression) of the European Convention on Human Rights. It held that while the conviction amounted to an interference that pursued the legitimate aims of public safety, prevention of disorder and crime, and the protection of the rights of others, the penalty was disproportionate. The Court noted that the applicant's speech did not contain any direct or indirect incitement to terrorist violence and rather advocated continuing along a democratic path. The domestic courts' assessment that the speech amounted to "hate speech" was not followed by the ECtHR.

In the case of *Otegi Mondragón v. Spain* (Application no. 2034/07), a Basque politician, Mr. Arnaldo Otegi Mondragón, during a press conference made critical remarks about the King of Spain following a police operation against a Basque newspaper and allegations of ill-treatment. He was subsequently convicted of serious insult against the King and sentenced to one year's imprisonment. The ECtHR found a violation of Article 10 (freedom of expression). It acknowledged that the interference pursued the legitimate aim of "protection of the reputation or rights of others" (the King's reputation). However, it ruled that the imposition of a prison sentence for value judgments made in the context of a public debate of general interest, even if potentially hurtful, was a disproportionate limitation on freedom of expression in a democratic society. The King, as Head of State, is not immune from political criticism.

Organizations like Amnesty International and Human Rights Watch have been highly critical of the law. They argue that its broad and vague wording has a "chilling effect" on freedom of expression. They contend that the law has been used to punish satire, criticism, and art that may be offensive but does not pose a real and immediate threat of violence (Amnesty International, 2021). The Council of Europe's Commissioner for Human Rights and the UN Committee against Torture have both expressed concern about the law (COE Commissioner HR, 2018; CAT, 2015). They argue that it should be reformed to comply with international human rights standards, which require that any restrictions on freedom of expression must be necessary, proportionate, and based on a clear and imminent risk of violence (Council of Europe Commissioner for Human Rights, "Misuse of anti-terror legislation threatens freedom of expression", Comment, 4 December 2018). In Spain, there is an ongoing debate among legal scholars and judges about the application of Article 578. The central issue is how to balance the right to free expression with the state's legitimate need to protect national security and the dignity of victims of terrorism (Gascón Cuenca, 2020; Alonso & Reinales, 2005; Miró-Llinares & Gómez-Bellví, 2020; Martín-Herrera,²⁰²²).

Some judges have taken a very literal interpretation of the law, while others have been more lenient, looking for a clear intention to incite violence. The different rulings in similar cases have highlighted the lack of a consistent judicial standard. The differing outcomes in the cases of *Pablo Hasél* and *Cassandra Vera* are often cited to illustrate the problem. While both individuals were prosecuted for online speech that made reference to historical acts of terrorism, the Supreme Court upheld Hasél's conviction while overturning Vera's. The difference in the rulings was often attributed to the judicial interpretation of the context, intent, and potential for harm of the statements. The Supreme Court found Vera's jokes to be satirical and not a real threat, but it took a different view of Hasél's lyrics and tweets, which were seen as more overtly confrontational and glorifying of violence (Duhart, 2025).

Lastly, the phenomenon of *ongi etorri* serves as another point of contention in the freedom of Expression vs. public order debate. It is a public welcome or homage offered in some Basque municipalities to members of the ETA, or members of the radical *abertzale* (Basque nationalist) left after they are released from prison, having served sentences for terrorism-related crimes. These events are often public



and symbolic, sometimes featuring traditional Basque ceremonies, banners, applause, and other forms of community recognition for the released prisoners (Gorter, Cenoz & van der Worp, 2021). The events have repeatedly led to legal debate in Spain, balancing the right to freedom of expression and assembly against laws concerning the glorification of terrorism and the protection of the victims' rights.

CONCLUSIONS

In the end, the results of the analyzed legal fight against ETA have been mixed, and the process is still ongoing. Even after ETA's dissolution in 2018, the legal process has continued. The Spanish judiciary is still pursuing members of the organization for past crimes, including many unsolved murders. The prosecution of former ETA members for long-standing crimes has been a major point of contention, with victims' associations calling for justice and some activists arguing that the legal actions are politically motivated. Victims' associations point out that nearly half of the murders committed by ETA remain unsolved. They argue that the defeat and disbandment of ETA should not mean an end to the search for justice for these victims. For them, a democratic society cannot "turn the page" without holding the perpetrators of these crimes accountable. A mission report from the European Parliament's Committee on Petitions, following a visit to Spain in November 2021, directly addresses this issue. The report was in response to a petition from victims of ETA terrorism. It states that, according to the petitioner, there were 379 unsolved murders perpetrated by ETA, which represents almost half (44%) of the total number of victims. The report notes that the Victims of Terrorism Foundation (*Fundación de Víctimas del Terrorismo*) also cited more than 300 unsolved cases (European Parliament, "Mission Report - following the fact-finding visit to Spain from 3 to 5 November 2021, in relation to 379 still unsolved murders committed by the terrorist group", ETA2019-2024, 25.04.2022).²

Overall, the prosecution of ETA was a multi-faceted approach that combined robust policing and intelligence-gathering with a specific and powerful legal framework designed to counter terrorism. It was instrumental in weakening and ultimately defeating the organization.

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² European Parliament, "Mission Report - following the fact-finding visit to Spain from 3 to 5 November 2021, in relation to 379 still unsolved murders committed by the terrorist group", ETA2019-2024, 25.04.2022, https://www.europarl.europa.eu/doceo/document/PETI-CR-702917_EN.pdf,28.8.2025



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POSITIVE OBLIGATION OF THE STATE TO PROPERLY VET A POLICE OFFICER BEFORE ISSUING HIM OR HER A FIREARM

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ABSTRACT

Purpose: The paper argues that Article 2 of the European Convention on Human Rights (ECHR) imposes a positive obligation on states to properly vet a police officer before issuing him or her a firearm.

Design/Methods/Approach: To explain the content of the state's obligation to properly vet a police officer before issuing him or her a firearm, the paper applies qualitative content analysis of judgments of the European Court of Human Rights selected as illustrations in the Guide on Article 2 of the ECHR (as updated on 31 August 2024) published by the Strasbourg Court.

Findings: The analysis of the judgments provided in the paper shows that the state is obliged to put in place and apply a system of adequate and effective safeguards designed to prevent police officers from making improper use of firearms. Article 2 of the ECHR also requires the state to subject the selection of agents allowed to carry a firearm to particular scrutiny. The national authorities are expected to set high professional standards within the police. As the paper explains, even a harmful action taken by a state agent outside his or her duties in certain circumstances may be imputable to the state.

Originality/Value: The findings of the paper, as summarized in the conclusion, contribute to an ongoing academic debate about the scope and content of the state's obligation to protect life under Article 2 of the ECHR. By identifying the content of the State's obligation to properly vet a police officer before issuing him or her a firearm the paper also contributes to the existing literature on police vetting process.

Keywords: right to life, positive obligation, Article 2 of the ECHR, firearm, vetting, police

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INTRODUCTION

The existence of the positive obligation to protect life under Article 2 of the European Convention on Human Rights (ECHR) is no longer an issue in the human rights literature. However, its scope and content, as well as the circumstances under which it can be triggered are still the subject of vigorous debate among the scholars. The paper contributes to this debate by providing arguments that under certain circumstances the State's failure to properly vet a police officer allowed to carry a firearm may give rise to a violation of Article 2 of the ECHR.

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It argues that Article 2 of the ECHR requires states to properly vet a police officer before issuing him or her a firearm. To support the position the paper applies a content analysis of judgments of the European Court of Human Rights (ECtHR; the Strasbourg Court) selected as illustrations in the Guide on Article 2 of the ECHR (as updated on 31 August 2024) published by the Strasbourg Court. The Guide sums up the case-law on Article 2 (right to life) and explains “the key principles in this area and the relevant precedents” (Guide, 2024), so one may consider it as a useful starting point for researching the state’s positive obligation to protect life. It informs the readers about the fundamental judgments delivered by the ECtHR. The paper identifies two judgments² (cited in the Guide) as particularly relevant for the subject under discussion (obligation to vet): the judgment in the case *Sašo Georgiev v FYR Macedonia* and that in the case *Gorovenky and Bugara v Ukraine*.³ The analysis of the judgments (underlining the fact that the state may be held responsible for actions of its police officers (agents) taken even outside their official duties) confirms the main thesis of the paper (that the state is obliged to properly vet a police officer before issuing him or her a firearm under Article 2 of the ECHR). In addition, it suggests that states may fulfill this obligation by developing an appropriate legislative and administrative framework compatible with the requirements of Article 2 in this area and implementing the legislation effectively in practice.

To explain these findings, as summarized in the conclusion, Part I of the paper describes the concept of positive obligations (key characteristics, legal basis and purpose). Part II of the paper discusses the content and scope of the state’s positive obligation under Article 2 of the ECHR to protect life, emphasizing that it should not be interpreted in such a way as to impose an excessive, unrealistic, burden on states. Finally, Part III of the paper analyses in detail the state’s obligation to properly vet a police officer before issuing him or her a firearm by referring to the case law of the European Court of Human Rights.

POSITIVE OBLIGATIONS UNDER THE ECHR: GENERAL REMARKS

The existence of positive obligations under the European Convention on Human Rights (expressed in the text and implied by the Court) in addition to negative obligations is no longer an issue in the human rights literature. The case law of the European Court of Human Rights discourages any effort to argue the opposite. It clearly reveals that since the late 1960s (the Belgian linguistic case) positive obligations have been developed by the Court under virtually all articles of the Convention (see: Rainey, McCormick & Ovey, 2021; Mowbray, 2004; Mowbray, 2012; Greer, 2006; Akandji-Kombe, 2007;), including such which require the State to take positive measures “even in the sphere of relations between individuals, if need be” (ECtHR, 1988, para. 32).

The European Court of Human Rights did not “develop a general theory of the positive obligations which may flow from the Convention” (ECtHR, 1988, para. 31), nor has it provided a formal definition of the concept of positive obligation (Mowbray, 2004; Akandji-Kombe, 2007). However, its case law helps us understand that the key characteristic of positive obligations (whether substantive or procedural) is that in practice they require states to take measures, to take action (such as to investigate a killing, to adopt legislation or to train the law-enforcement agents). It also reveals that the Europe-

2 As the European Court of Human Rights clearly established “the Court’s judgments in fact serve not only to decide those cases brought before the Court but, more generally, to elucidate, safeguard and develop the rules instituted by the Convention, thereby contributing to the observance by the States of the engagements undertaken by them as Contracting Parties” (ECtHR, 1978, para. 154).

3 The paper focuses on these two judgments due their particular relevance to the main subject under discussion. However, in order to explain the state’s positive obligation to protect life, and in this context to explain the content of the state’s obligation to properly vet a police officer before issuing him or her a firearm, it also refers to other ECtHR’s judgments, including landmark ones (*L.C.B. v. the United Kingdom*, *Osman v United Kingdom*, *Öneryıldız v. Turkey*, *Makaratzis v. Greece*, etc.) cited in the Guide as well.



an Court of Human Rights based the positive obligations on a particular substantive article (standard-setting provision of the ECHR) or on a combination of that article with Article 1 of the ECHR (which imposes an obligation on states “to secure to everyone within their jurisdiction the rights and freedoms” defined in the Convention) or with general principles of European law (Akandji-Kombe, 2007; Mowbray, 2004). In any case, all of them “pursue the same goal, which is the effective application of the European Convention and the effectiveness of the rights it secures” (Akandji-Kombe, 2007, 9). As the European Court of Human Rights has reiterated many times in the context of the positive obligations “the Convention is intended to guarantee not rights that are theoretical or illusory but rights that are practical and effective” (ECtHR, 1979, para. 24). One may agree with Stoyanova that the principle of effectiveness, “has a crucial role for justifying positive obligations and determining their scope” (Stoyanova, 2023, p. 11). By resorting to the concept of positive obligation, that is, by developing different types of positive obligations (substantive and procedural) the Strasbourg Court aims to guarantee effective enjoyment of rights protected by the ECHR. It uses them also to interpret the Convention (as a living instrument) in the light of the present-day conditions. Although the European Court of Human Rights has not developed a general theory of the positive obligations yet, its case law provides a useful basis for one to analyse the content (measures that states are obliged to take) and scope of each positive obligation developed by the Court, including of the state’s positive obligation under Article 2 of the ECHR to protect life.

POSITIVE OBLIGATION TO PROTECT LIFE: CONTENT AND SCOPE

It is well established in the case law of the European Court of Human Rights that Article 2 of the European Convention on Human Rights (right to life) “enjoins the State not only to refrain from the intentional and unlawful taking of life, but also to take appropriate steps to safeguard the lives of those within its jurisdiction” (ECtHR, 1998, para. 36). In other words, it imposes a positive obligation on state to protect life in addition to its negative obligation to refrain from the intentional and unlawful taking of life. Such a positive obligation to protect has been found to arise in a number of different contexts (road safety, health care sector, environmental disasters, rescue operations and many others). The European Court of Human Rights has not provided an exhaustive list of sectors, but observed that it “must be construed as applying in the context of any activity, whether public or not, in which the right to life may be at stake”. (ECtHR, 2013, para. 65). Consequently, the positive obligation to protect life “is to be interpreted in such a way as not to impose an excessive burden on the authorities, bearing in mind, in particular, the unpredictability of human conduct and the operational choices which must be made in terms of priorities and resources”. (ECtHR, 2013, para. 65). “In particular, the choice of means for ensuring the positive obligations under Article 2 is in principle a matter that falls within the Contracting State’s margin of appreciation” (ECtHR, 2012a, para. 33). As the European Court of Human Rights explicitly stated “there are a number of avenues for ensuring Convention rights, and even if the State has failed to apply one particular measure provided for by domestic law, it may still fulfill its positive duty by other means” (ECtHR, 2004a, para.107).

Following much of the human rights literature one may argue that the positive obligation of the State to protect life under Article 2 of the ECHR encompasses two aspects: a substantive aspect and a procedural aspect, namely some form of effective investigation of deaths, life-threatening injuries or disappearances. (Stoyanova, 2023; Wallace, 2019; Milenkovska, 2014; Korff, 2006). It entails “above all a primary duty on the state to put in place a legislative and administrative framework designed to provide effective prevention” (ECtHR, 2012b, para, 42). Article 2 of the ECHR requires the State to regulate all activities and situations that may pose a threat to life (with regard to level of potential risk)



and to back up the regulation by law-enforcement machinery, “which consists centrally of an effective judicial system to enforce criminal and other laws required by Article 2” (Harris et al. 2014, 206). In addition to the duty to provide a regulatory framework, states are also under obligation to take preventive operational measures to protect life.

However, “not every risk to life can entail for the authorities a Convention requirement to take operational measures to prevent that risk from materialising” (ECtHR, 2013, para. 65). As the European Court of Human Rights explained “for a positive obligation to arise, it must be established that the authorities knew or ought to have known at the time of the existence of a real and immediate risk to the life of an identified individual [or individuals] and that, if so, they failed to take measures within the scope of their powers which, judged reasonably, might have been expected to avoid that risk (ECtHR, 2013, para. 65). The positive obligation to take preventive operational measures “has been extended beyond the protection of identified individuals at risk to the protection of the public at large in life-threatening situation” (Harris et al, 2023, 218). In any case some nexus (causation) between the harm (or the risk of harm) and the State’s failure to take preventive measures must be established. When the perpetrator (source of harm) is within the control of the State, as some authors observe, “then it is more likely that the omission to prevent the harm (or the risk of harm) that he or she has ultimately inflicted, irrespective of the identifiability of any possible victims, is considered causative” (Stoyanova, 2023, 59).

It is indisputable that police officers are within the control of the State, and the state may be held responsible for their acts or omissions. Therefore, to comply with positive obligation to protect life under Article 2 of the ECHR, and thus to avoid responsibility, states are obliged to take a number of measures to protect persons from lethal use of force by the police officers. They should put in place a legal and administrative framework defining “the limited circumstances in which law-enforcement officials may use force and firearms, in the light of the international standards which have been developed in this respect”. (ECtHR, 2004b, para.59) and providing “a system of adequate and effective safeguards against arbitrariness and abuse of force... and even against avoidable accidents (ECtHR, 2004b, para.58). Additionally, they are required to set high professional standards within the police and ensure that police officers meet the requisite criteria, in particular by training them to assess whether or not there is an absolute necessity to use firearms and properly vet them before issuing him or her a firearm (ECtHR, 2025).

The analysis provided below explains the State’s obligations under Article 2 of the European Convention on Human Rights to properly vet a police officer before issuing him or her a firearm.

OBLIGATION TO PROPERLY VET A POLICE OFFICER BEFORE ISSUING HIM OR HER A FIREARM

As noted in the introduction, the paper uses two cases determined by the ECtHR to explain the state’s obligation to properly vet a police officer before issuing him or her a firearm. The first case, *Gorovenky and Bugara v Ukraine*, concerns a police officer D. (deputy head of the criminal investigation department Pyatykhatky District Police Office) who, while off duty, deliberately killed two persons with the police gun which he carried on him at all times (ECtHR, 2012, para.7). The second case, *Sašo Georgiev v FYR Macedonia*, concerns a police reservist⁴, R.D., who left the place of duty (the police

4 The incident took place in 2002 when the country was facing the immediate consequences of the 2001 armed conflict (see Milenkovska & Taševska Remenski, 2016), so one may understand why police reservists were engaged in the police. According to the Internal Affairs Act, as in force at that time, they were regarded as State officials during their period of service (ECtHR, 2012b).



station) without informing his superiors (without authorization) and went to a bar where, while intoxicated, unintentionally pulled the trigger of his service gun and injured one person (put his life at risk; life-threatening injury). The incident described in the second case took place in 2002 when the country was facing the consequences of 2001 armed conflict (see Milenkovska & Taševska Remenski, 2016)

The ECtHR found a violation of Article 2 of the ECHR (positive aspect) in both cases, and thus supported the position that under certain circumstances – such as breach of the existing domestic regulations concerning issuing a gun to a police officer by the competent authorities or state's failure to establish a system of adequate and effective safeguards (including during recruitment) designed to prevent police officers from making improper use of service gun – a state may be held responsible for actions of its police officers (agents) taken even outside their official duties (see, for example, ECtHR, 2012b, para. 48). The decision whether the responsibility can be imputed to the state or not depends, in each case, on the totality of the circumstances and the nature and circumstances of the conduct in question (see, ECtHR, 2012b, para. 48).

In the case *Gorovenky and Bugara v Ukraine* the applicants complained that “by failing to supervise the keeping and use of firearms by police officer D. the State had not complied with its positive obligations as provided in Article 2 of the Convention. However, these conclusions had been ignored by the national courts in the civil proceedings for compensation,” (ECtHR, 2012a para, 25, 37). The national court in the proceedings “held that no causal link existed between the failure of the police officers to comply with the law in force and correctly assess the case when allowing their subordinates to carry a weapon, and the lethal incident involving this subordinate” (ECtHR, 2012a, para. 37).

In contrast, the European Court of Human Rights identified a causal link between the failure and the incident. When assessing the circumstances of the case the Court made several important observations (based on police internal investigation launched after the incident, special ruling of the Regional Court “informing the head of the Regional Police Office of serious deficiencies in the activities of the Pyatykhatky District Police Office” (ECtHR, 2012a, para. 14) and relevant domestic law). First, it observed that the superiors of the police officer “had failed to appropriately assess his personality and, despite previous troubling incidents involving D. [dismissed from the position of section commander for alcohol abuse when studying at police college; disciplinary offences; alcohol abuse], had allowed him to carry a weapon, which had led to the incident in question” (ECtHR, 2012a, para. 35). Although he was known to abuse alcohol, they “had not withdrawn his police gun in due time” (ECtHR, 2012a, para. 10). Second, it noted that “the national law expressly forbids issuing guns to police officers who do not have appropriate equipment for their safe storage”, and that it was acknowledged by the internal investigation that it had never been checked where D. had stored his gun at home” (ECtHR, 2012a, para. 36). Finally the Court observed that “in particular the absence of a safe storing place could be the reason for D.'s carrying the gun with him at all times while on and off duty, which factored into the lethal outcome of D.'s quarrel with his victims (ECtHR, 2012a, para. 36).

These observations of the Court clearly reveal that authorities within the District and Regional Police Offices failed to take appropriate measures within the scope of their powers which, judged reasonably, might have been expected to avoid the risk to human lives. So, the European Court of Human Rights applied the general principles established in its case law on positive obligation to protect life under Article 2 of the ECHR to the circumstances of the case. And, it found a violation of the right to life by Ukraine – summarizing in its concluding remarks that “the police officer, who deliberately shot two persons with his police gun, was issued with the gun in breach of the existing domestic regulations, since it was not checked where he would be keeping it when off duty, and his personality was not correctly assessed in the light of his previous history of disciplinary offences” (ECtHR, 2012a, para. 39). The following two elements played a significant role in its reasoning: a) “the State's duty to safeguard



the right to life must be considered to involve the taking of reasonable measures to ensure the safety of individuals and, in the event of serious injury or death, having in place an effective independent judicial system securing the availability of legal means capable of establishing the facts, holding accountable those at fault and providing appropriate redress to the victim” (ECtHR, 2012a, para. 34); b) “states are expected to set high professional standards within their law-enforcement systems and ensure that the persons serving in these systems meet the requisite criteria. In particular, when equipping police forces with firearms, not only must the necessary technical training be given but the selection of agents allowed to carry such firearms must also be subject to particular scrutiny” (ECtHR, 2012a, para. 38).

The European Court of Human Rights reiterated the same position in the second case under discussion in this paper, the case of Sašo Georgiev v. FYR Macedonia. In this case, “the applicant complained under Article 2 of the Convention that he had been the victim of a life-threatening action taken by R.D., a State official” (ECtHR, 2012b, para. 28), a police reservist, and argued that the state should be held responsible for his action. The domestic courts did not establish State responsibility for the damage suffered “on the ground that the State did not have the necessary capacity to be sued because R.D. had not been acting in an official capacity but rather as a private person, and the damage had not been caused in the course of or in connection with the performance of his duties” (ECtHR, 2012b, para. 46). In contrast, the European Court of Human Rights, after assessing the totality of the circumstances and considering the nature and circumstances of the conduct in question, held the State responsible despite the fact that the harmful action was taken by a police reservist outside his duties. The Court accepted that “the authorities could not objectively have foreseen the applicant’s insubordinate behavior and his subsequent action in the bar” (ECtHR, 2012b, para. 50). However, the Court took into consideration the State’s obligation “to put in place and rigorously apply a system of adequate and effective safeguards designed to prevent its agents, in particular temporary mobilised reservists, from making improper use of service weapons provided to them in the context of their official duties” (ECtHR, 2012b, para. 50). And, in the context of this obligation it noted the fact that the Government had not informed the Court of any regulations in force in this respect (ECtHR, 2012b, para. 50). In addition, the European Court of Human Rights criticized the provision of the national Internal Affairs Act, “which required that State agents – as R.D. was – perform their duties “at all times, whether on or off duty” (ECtHR, 2012b, para. 50). According to the Court “the application of this provision had obvious benefits for society, but it also involved some potential risks. The permanent engagement of State agents as police officers required that they always carry their service weapon in order to exercise their duties” (ECtHR, 2012b, para. 50).

It follows from the foregoing that the European Court of Human Rights identified certain deficiencies in the national legal framework relevant for the circumstances of the case. It took them into consideration when assessing the state’s compliance with Article 2 of the ECHR. Additionally, it took into consideration the fact that “the Government had not informed the Court whether any assessment was made by the national authorities as to whether R.D. was fit to be recruited and equipped with a weapon” (ECtHR, 2012b, para. 52). And, “in these circumstances it considered that his harmful action must be imputable to the state” (ECtHR, 2012b, para. 52). The Court did not find evidence that the national authorities subjected the selection of agents allowed to carry such firearms to particular scrutiny as Article 2 of the ECHR requires.

One may conclude, based on the Court’s judgment, that in the case of Sašo Georgiev v. FYR Macedonia like in the case of Gorovenky and Bugara v Ukraine, the state failed to properly vet a police officer/reservist before issuing him a firearm, and thus was held responsible for violation of the right to life as protected by Article 2 of the Convention. The analysis of the judgments supports the position that



positive aspect of the article requires state to protect life by properly vetting a police officer before issuing him or her a firearm.

The European Court of Human Rights did not explain the vetting process, nor did it provide exhaustive list of measures that the state is obliged to take to properly vet a police officer. However, notwithstanding the fact that “the choice of means for ensuring the positive obligations under Article 2 is in principle a matter that falls within the Contracting State’s margin of appreciation (ECtHR, 2012b, para. 33), one may identify certain steps that the State is expected to take to avoid being held responsible for violation of the right to life based on the analysis of the Court’s judgments. Above all the State has to put in place a legislative and administrative framework designed to provide high professional standards within its law-enforcement systems and ensure that the persons serving in these systems meet them (see ECtHR, 2012b). This framework must ensure that selection of agents (including police reservists) allowed to carry firearms will be subjected to particular scrutiny (the Court endorsed this standard but it did not provide further elaboration). In particular, it must provide effective protection of lives, by requiring the national authorities to make an assessment during the selection that each agent is fit to be recruited (selected) and equipped with a firearm (correctly assess the personality of each agent; establish that he or she satisfies the criteria of the necessary technical firearm training; conduct a background check, *inter alia* check his or her previous history of disciplinary offences). Superiors within the police are expected to follow (monitor, control) the work of subordinates, as well as supervise their behavior when they are off duty, and respond to any incident or disciplinary offence, including by withdrawing the police gun in due time if necessary (for example in a case of alcohol abuse).

Besides putting in place a legal framework which guarantees that a police officer will be properly vetted before issuing him or her a firearm, the state is obliged to implement rigorously the legislation in practice, “in a manner which is effective to protect lives” (Harris *et al*, 2023, 210). Any failure to properly vet a police officer must be established and those at fault held accountable, which implies that the state must have in place an effective independent judicial system. The European Court of Human Rights has reiterated many times so far in different circumstances that the legal framework concerning protection of right to life must “be backed up by law-enforcement machinery for the prevention, suppression and sanctioning of breaches of such provisions” (ECtHR, 1998, para. 115).

It follows that the European Court of Human Rights suggests that State’s failure to properly vet a police officer before issuing him or her a firearm exposes the lives of those within its jurisdiction at risk of police misconduct. Much research on police accountability conducted so far support the same position that police vetting during the police recruitment process (pre-hiring screening) and thereafter (after the employment; after issuing the service weapon) is an important tool that the State can use to prevent police misconduct (Cubitt, 2023; Huff, White, & Decker, 2018; Kane & White, 2009; Simpson & Kirk, 2023). In this context, some scholars attempt to understand and explain factors that could improve this process. For instance, Cubitt (2023) argues that police intelligence, and criminal records data should be integrated into vetting processes. The European Court of Human Rights has not explained the vetting process (has not introduced standardized vetting procedure). However, it has established that police vetting should be a continuous process and identified certain steps that authorities are expected to take in order to properly vet a police officer before issuing him or her a firearm (including background check), and thus meet the requirements of Article 2 of the ECHR. The states parties to the ECHR are obliged to comply with the Convention’s requirements, so national authorities, experts and scholars in these countries should take them into account when dealing with the question of police vetting.



CONCLUSION

The analysis of the case law of the European Court of Human Rights provided in this paper confirmed the thesis that Article 2 of the European Convention on Human Rights (positive limb) requires states to properly vet a police officer before issuing him or her a firearm. Above all states are expected to put in place a legislative and administrative framework compatible with the requirements of Article 2 in this area, but also to rigorously implement the legislation in practice. They must set high professional standards within the police and ensure that all police officers meet them. The selection of agents (including police reservists) allowed to carry firearms must be subjected to particular scrutiny. National authorities must make an assessment during the selection that each agent is fit to be recruited (selected) and equipped with a firearm. To avoid being held responsible for the violation of Article 2 of the ECHR states are expected to incorporate the following elements in the vetting process: (i) a standardized vetting procedure (assessment of personality, psychological assessment, disciplinary record, technical firearm training; background check); (ii) record-keeping and audit trails; (iii) supervision of the police officers' behavior even when they are off duty and periodic reassessment of suitability (iv) mandatory temporary withdrawal of firearms in risk situations, such as in a case of alcohol abuse; and (v) clear rules for off-duty carrying and storage of the service weapon.

Of course, the European Court of Human Rights did not provide exhaustive (closed) list of measures that states have to take to comply with their obligation to properly vet a police officer before issuing him or her a firearm. It is well established that states enjoy a margin of appreciation in determining the steps to be taken to ensure fulfillment of positive obligations under the ECHR.

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CHALLENGES AND PERSPECTIVES OF THE DIGITAL TRACE IN THE ERA OF ARTIFICIAL INTELLIGENCE AND DEEPAKE TECHNOLOGIES

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ABSTRACT

Purpose: The paper examines how artificial intelligence, particularly deepfake technologies, influences the meaning and usability of the digital trace in criminalistics. The aim is to identify the main challenges in securing and evaluating digital evidence and to outline perspectives for its further application in criminal proceedings.

Design/Methods/Approach: The study applies an analytical approach that combines a review of current technological trends with an examination of criminalistic methods used for detecting and interpreting digital traces. It is based on available scholarly sources and international reports that reflect ongoing debates on the credibility of digital evidence.

Findings: Artificial intelligence complicates the identification and reliability of traditional digital traces, while at the same time generating new types of traceable artifacts that can be used in criminalistics. Deepfakes illustrate the risks of manipulating multimedia evidence, but also emphasise the need for developing new methods of detection and evaluation.

Originality/Value: The paper offers a multidisciplinary perspective on the digital trace in the age of artificial intelligence. By linking technological, criminalistics, and legal aspects, it underlines the necessity of methodological and legislative adaptation in order to preserve the credibility of digital evidence in criminal proceedings.

Keywords: digital trace; criminalistics; deepfake; digital evidence; provenance; C2PA; AI Act.

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INTRODUCTION

The circumstances in which traces appear, persist, and are examined in criminalistics are radically altered by the digitisation of every aspect of social life. Digital traces are an extension of pre-existing methods of information recording and transmission within technical systems, and are not a novel phenomenon. Digital traces have an electromagnetic or electronic material substrate that grounds them in the physical world, despite the fact that their form is technologically mediated rather than physically tangible. Their ontological character is evolving; they may now come from autonomous or generative systems in addition to human activity. Therefore, informational, technological, and interpretive qualities determine their criminalistic value.

According to this concept, a digital trace is a particular kind of criminalistics trace - the field trace, which is a specific information carrier that results from automated or human activity and that emerges, evolves, and partly vanishes within the digital environment. Its capacity to mediate the relationship between an object with act production, and its consequences - trace, that is, to make it possible to be an information carrier for reconstructing an event, identifying subjects, and confirming the veracity of data obtained - gives it criminalistics value. (Metenko & Metenkova, 2024; Metenko, 2004)

The authenticity and recognition of digital traces are called into question by generative AI and deep-fake systems, which can create artificial content that is nearly identical to the real thing. These necessities redefine techniques for protecting and evaluating digital evidence, as well as establish new standards for evidentiary value and manipulation detection. The digital trace is frequently a potentially artificial interpretation rather than a reflection of reality.

THEORETICAL FRAMEWORK OF THE DIGITAL TRACE IN CRIMINALISTICS

The criminalistic trace is an objectively existing carrier of information about an event that is related to the phenomenon under research and investigation in terms of causality, time, and space. The digital trace is not information itself but a carrier of information that can be interpreted for criminalistics purposes, serving as a medium through which the event becomes knowable. According to the Slovak school of criminalistics, any digitally stored or transmitted information with evidentiary value is considered a digital trace. With the ability to record and transmit information that enables the reconstruction of a past event, it acts as an information link between an action and its result. The information content, carrier, criminalistic value, and connection to the event define each trace. (Metenko & Metenkova, 2024; Metenko, 2004)

Despite being conceptually identical to the traditional trace, the digital trace is qualitatively different because it only exists through its technological medium, such as data systems, networks, or devices, and vanishes as soon as the carrier's integrity is jeopardised (Casey, 2011). Digital traces, in contrast to other material traces, are relatively ephemeral and unstable; their continued existence is contingent



upon the reliability of data structures, storage systems, and the precision of the collection and preservation processes. It is a unique kind of evidential phenomenon that criminalistics must interpret within a new ontological framework due to its volatility and reliance on technological stability.

The digital trace is a mediated construct that is perceived through its technological representation from an epistemological perspective. There are two levels of interpretation: the technical level, which involves creating and processing data, and the cognitive level, which involves assigning meaning. Verification standards that guarantee the validity, authenticity, and integrity of digital evidence are necessary for this dual mediation (Eurojust, 2022). From a criminalistic perspective, this mediation represents a dual cognitive process: the trace connects the technological layer of data with the epistemic layer of understanding by both transmitting information and co-creating the investigator's knowledge about the investigated activity. The proposed Digital Authenticity Framework (D-AUTH), which operationalises the verification of digital trace as future evidence through procedural, contextual, and technical controls, is based on these principles.

Digital traces can be the result of automated or human activity. While secondary traces result from system processes, primary traces are the result of intentional or unintentional human activity (Casey, 2011; Brenner, 2010). The establishment of their integrity, continuity, and origin determines their evidential value.

Analytically, the digital trace blends causal determinism and information abstraction, necessitating the fusion of traditional forensic principles with computer-science techniques and methods. Hash verification, complete chain-of-custody documentation, and the preservation of the original data structure continue to be crucial procedural requirements (INTERPOL, 2021).

By creating data that has all the formal characteristics of authentic traces, but no causal connection to actual events, artificial intelligence makes this framework more difficult to understand (Mirsky & Lee, 2021; Verdoliva, 2020). These “pseudo-traces” cast doubt on criminalistics epistemological underpinnings and change the main inquiry from “What does the trace reveal?” to “Is the trace real?” (Qureshi et al., 2024). As a result, the digital trace maintains the traditional trace identification, reconstruction, and verification capabilities while requiring a revised methodological and epistemological interpretation appropriate for the algorithmic environment of contemporary reality. These theoretical premises later form the basis of the proposed Digital Authenticity Framework (D-AUTH), which operationalises the verification of authenticity, provenance, and integrity of digital evidence in AI-mediated environments.

TERMINOLOGICAL CLARIFICATION: TYPOLOGY OF DIGITAL TRACES

On the basis of the definition of terms for digital trace typology, digital traces can be grouped according to their provenance, potential for evidence, and causal relationship to reality. From a criminalistic perspective, these classifications specify not only the data source but also its dependability and probative purpose. Communication logs, login credentials, and file metadata are examples of primary digital traces that are directly caused by human activity in the digital environment and have a direct causal relationship to human behaviour (Casey, 2011; Brenner, 2010).

Systems and infrastructures, such as log files, cache memory, or network routing data, automatically create secondary digital traces without direct human involvement (Casey, 2011).



Artificial intelligence or generative models are the source of synthetic traces, which have the formal characteristics of evidence (timestamp, format, metadata) but no confirmed causal connection to any actual event (Mirsky & Lee, 2021; Verdoliva, 2020; Qureshi et al., 2024). The growing interdependence between algorithmic and human activity in digital environments is reflected in hybrid traces, which combine elements of AI and authenticity (for example, real audio combined with artificial imagery).

Lastly, purposefully created or falsified artifacts that mimic real evidence are known as pseudo-traces. Their ontological falsity and perceptual realism pose an epistemological risk by blurring the boundary between reality and simulation. The idea of hybrid or pseudo-traces, though not explicitly acknowledged in conventional criminalistic theory, captures the changing epistemic difficulties of AI-mediated environments.

This typology emphasises the need for multimodal verification and critical evaluation of authenticity in AI-mediated contexts, while also capturing the dynamic nature of digital evidence, where traces may come from both human and machine behaviour.

This typology clarifies the methodological and epistemological differences among digital artifacts used in criminalistics/forensic analysis. The ability to accurately classify a trace is necessary for evaluating its causal relationship to an event, chain of custody, and probative value in court. This approach, which emphasises the preservation of carrier integrity and contextual documentation of the digital environment, is in line with current international forensic standards, including ENFSI's guidelines for image and video authenticity verification and INTERPOL's Guidelines for Digital Forensics First Responders (2021).

ARTIFICIAL INTELLIGENCE AS A FACTOR OF TRANSFORMATION IN CRIMINALISTIC TRACE ANALYSIS

Since it alters the creation, processing, and interpretation of traces, the impact of artificial intelligence on the evolution of criminalistic trace analysis marks a paradigm shift in criminalistics. AI presents new forms that are partially or completely algorithmic in origin, following the typology of digital traces. As a result, the field must reevaluate its methodological and epistemological presumptions. AI is now a topic, a tool, and a distorting factor of criminalistic cognition rather than just a tool to support analysis.

1. AI systems produce traces themselves, including logs, configuration information, algorithmic parameters, and outputs that document autonomous system behaviour, which can be examined for criminalistics purposes. Since the meaning of these machine-origin traces depends on knowing how the model or system functioned, specialised techniques of algorithmic attribution and contextual reconstruction are needed (Casey, 2011).
2. By processing large datasets, identifying patterns, and connecting disparate data, artificial intelligence (AI) improves investigators' analytical skills. When decisions are made using "black box" models, it facilitates probabilistic reasoning but also raises questions about accountability, reproducibility, and transparency (Eurojust, 2022). In order to meet evidential requirements, algorithmic outputs must continue to be interpretable, verifiable, and reproducible.
3. The fundamental tenet of causality is called into question by AI, which distorts reality by creating artificial content that is identical to authentic records. Although "pseudo-traces" produced by deepfake technologies lack an ontological foundation in reality, they formally resemble genuine evidence (Mirsky



& Lee, 2021; Verdoliva, 2020). Through the so-called liar's dividend, these artefacts have the potential to skew perception, divert investigations, or erode reliable evidence (Chesney & Citron, 2019).

Therefore, algorithmic literacy and methodological discipline must be combined in criminalistics: detection, provenance verification, and contextual documentation must be used in addition to traditional analysis. Thus, the question of artificial intelligence becomes not only a technical one but also a philosophical and epistemological one, forcing criminalistics to consider not only "What does the trace reveal?" but also "Is the trace real?"

The function of criminalistics science must go beyond interpretation in this new setting, where traces may be artificially created or modified; it must also involve the detection and technical validation of authenticity. The primary detection techniques and their methodological drawbacks in AI-mediated evidence analysis are thus described in the following section.

TECHNICAL METHODS OF DETECTION AND THEIR LIMITATIONS

The primary reaction to the spread of manipulated media has been the quick development of AI-based forensic methods. They generally aim to discriminate between real and manipulated image, audio, or video data, often by identifying artefacts that may be incompatible with genuine content, although their approaches and transparency vary.

Benchmarking and Model Evaluation

For training and assessing detectors, public datasets like FaceForensics++ and the DeepFake Detection Challenge (DFDC) continue to be essential resources. The findings highlight the necessity of ongoing benchmarking by demonstrating that performance declines under compression, unknown synthesis methods, and out-of-distribution circumstances (Rössler et al., 2019).

Detection Approaches

Contemporary detectors based on convolutional neural networks (CNNs) and transformers often learn to recognise subtle spatial-temporal irregularities such as texture inconsistencies, blending edges, or micro-movements that can indicate manipulation (Verdoliva, 2020). In order to uncover manipulations that are invisible to the naked eye, complementary forensic techniques examine anomalies in the signal and metadata, such as double compression, irregularities in the sensor, or inconsistent EXIF data (Casey, 2011).

Provenance and Cryptographic Control

Projects such as the Content Authenticity Initiative and the C2PA standard embed signed manifests that document the origin and editing history of a file. Although they improve provenance verification, these credentials do not confirm that the scene being portrayed is accurate (Coalition for Content Provenance and Authenticity, 2024).

Limitations and Ongoing Evaluation

As generative models advance, so do detection tools. Techniques like post-processing, re-encoding, or "fingerprint removal" lessen generalisation, which means that no detector is completely trustworthy.



Provenance validation, multimodal content detection, and procedural safeguards like chain-of-custody and cryptographic hashing must thus be combined in three layers for effective verification.

With a focus on reproducibility and benchmark transparency, independent initiatives such as NIST's Open Media Forensics Challenge (Open MFC) continuously evaluate detection systems across modalities (NIST, 2024–2025).

LEGISLATIVE AND NORMATIVE FRAMEWORK OF THE EUROPEAN UNION

The European Union has created a unified regulatory framework governing accountability, transparency, and evidential admissibility in AI-assisted procedures in response to the swift integration of AI into legal and investigative systems.

The foundation of this framework is the Artificial Intelligence Act (Regulation (EU) 2024/1689), which goes into effect on August 1, 2024. While provisions for general-purpose AI systems (GPAI) go into effect on August 2, 2025, the majority of obligations will be applicable within 24 months. The Act establishes a risk-based methodology that calls for openness, record-keeping, and human supervision, especially for AI tools utilised in law enforcement and justice. It creates an obligation for criminalistics to guarantee algorithmic traceability, supervision, and model behaviour recording.

The first legally binding international treaty on AI, the Council of Europe Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law (2024), complements the EU Act by enshrining the principles of accountability, explainability, and judicial review for systems that impact fundamental rights (Council of Europe, 2024).

The Eurojust-eu-LISA Joint Report (2022) describes useful AI applications in criminal justice at the operational level, including NLP-based document analysis, digital evidence triage, and audio-visual anonymisation. Contextual integrity - maintaining software versions, configurations, and analytical audit logs - is emphasised as the basis for evidential reliability, which the AI Act subsequently reflects.

Lastly, the ENFSI and INTERPOL standards, which outline procedural requirements for securely gathering, archiving, and validating digital evidence, including keeping audit records of analytical settings, have incorporated AI-related recommendations (INTERPOL, 2021; ENFSI, 2021).

These tools work together to create a multi-layered regulatory framework that links technological innovation and evidential legality. To ensure that the evidential pursuit of truth is consistent with AI-driven realities, they demand that AI-assisted criminalistic techniques continue to be transparent, traceable, and reproducible.

CONCLUDING REMARKS ON THE ROLE OF ARTIFICIAL INTELLIGENCE IN CRIMINALISTICS

Artificial intelligence is reshaping the ontological, epistemological, and methodological foundations of criminalistics. It no longer functions merely as a tool but as an autonomous element influencing the creation, processing, and interpretation of information.

The concept of criminalistics trace must therefore be redefined. AI introduces “machine-generated realities” in which traces may arise without any causal link to real events. Criminalistic truthfulness - the ability of a trace to convey reliable knowledge about reality - requires new interpretative and verifica-



tion frameworks combining causality, identification, and reconstruction with technical mechanisms such as metadata analysis, algorithmic auditability, and synthetic-pattern detection.

AI enhances analytical efficiency by enabling large-scale data examination and the discovery of hidden patterns, yet simultaneously threatens evidential integrity by generating synthetic or falsified content. Criminalistics must thus adopt a balanced approach - *augmented judgment* - where algorithmic precision complements, but never replaces, human expertise and responsibility.

Normatively, digital-evidence standards based on digital traces must ensure accountability for autonomous outputs and the protection of data integrity. Ethical guidance is equally vital to prevent algorithmic bias and preserve due process and justice (Eurojust, 2022).

Criminalistics is entering a new developmental phase as an interdisciplinary science that must account for the cognitive processes of artificial systems. The trace, once a direct imprint of reality, increasingly becomes an algorithmic construct. Its future credibility depends on maintaining balance between methodology and technology, automation and accountability, and knowledge and its source - ensuring that even in an AI-mediated world, the pursuit of truth remains the central mission of criminalistics.

METHODOLOGICAL AND PRACTICAL IMPLICATIONS FOR CRIMINALISTICS

The most obvious example of how criminalistics has evolved in the era of artificial intelligence is the methodological reconfiguration of how digital trace is viewed, validated, and evaluated. The notion that a trace is a tangible record of an incident that arises from direct contact between an offender and their environment served as the basis for traditional criminalistics methodology. This model was effective as long as there was a clear causal relationship between the event and its trace. This relationship, however, falters in the age of algorithmic reality since artificial intelligence can now mediate, modify, or even create a trace.

This shift calls for a substantial methodological modification. The idea of digital authenticity must now be viewed by the field as the practical counterpart of material authenticity. While digital authenticity can be verified by physical or chemical examination, it must be established through a sequence of interconnected technical, analytical, and logical procedures. Therefore, a criminalistic analysis must take into account the circumstances surrounding the creation of the trace, processing, and transmission in addition to its content (Casey, 2011).

This modification has the methodological effect of giving traditional criminalistic categories an algorithmic and informational component. Instead of merely studying a trace as the result of an event, it is now possible to study it as the result of a processing system with its own internal logic and dynamics. Thus, it is necessary to create an analytical framework that can distinguish between authentic, fraudulent, and modified traces. This adds a new element to criminalistics by bringing the identification principle into the field of algorithmic attribution: the analysis of the behaviour and origin of the data object.

Theoretically, the ongoing development of criminalistics can be considered a part of the growth of security-oriented cognition. According to Ivančík (2022), the methodological foundations of security must consider the interdependence of knowledge, governance, and technology since every act of cognition also functions as an act of direction. The analysis of digital traces, which necessitates a systematic assessment of technological operations from the perspectives of security and cognition, can benefit equally from this concept.



Practically speaking, technical accuracy and interpretive reasoning must be combined in criminalistic analysis. Investigators must examine digital traces as evidence provenance, structure, data environment, and processing context in addition to its security. Therefore, European organisations (Eurojust, 2022) recommend establishing a comprehensive integrity ecosystem for digital traces use as evidence, which includes audit records of the algorithms used in data processing, software versions, system configurations, and metadata.

The core principles of criminalistic thinking - cause, credibility, and verification - must be maintained while being reinterpreted in the digital sphere. Whereas classical criminalistics focused on the physical relationships between a trace and an event, modern criminalistics must look into informational and algorithmic relationships, which are often indirect, probabilistic, and dynamic, even though they exist in a material environment. Since the outcome of such analysis is rarely a binary conclusion but rather a graded level of probability, higher levels of expertise and interpretive judgment are needed.

In this new context, the role of the criminalist changes from that of an observer to that of an interpreter of technological processes. The modern investigator needs to understand not only the evidence but also the systems of evidence generation, transformation, and analysis. As a result, criminalistic inquiry becomes an interdisciplinary process that integrates concepts from computer science, ethics, logic, and law. Without this information, the full complexity of digital traces evidential value cannot be assessed.

Special attention must also be paid to the issue of accountability for decisions made with AI assistance. When algorithmic outputs affect the conclusion of a criminal investigation or proceeding, it must be clear who is in charge of their use and interpretation. AI must be used as a tool to help, not as a decision-maker in and of itself, according to legal and methodological frameworks. This perspective is encapsulated in the concept of augmented judgment, which is decision-making that combines algorithmic precision with human critical oversight.

Ultimately, rather than being a threat, the methodological and practical implications of artificial intelligence should be viewed as an evolutionary catalyst. They compel criminalistics to systematically reexamine its theoretical foundations, expand its toolkit of methods, and seek out new insights into truth in an environment where reality itself can be manufactured. As a result, criminalistics is changing from being a science of traces to one that understands and interprets traces in the context of algorithmic reality. However, ensuring that truth can be recognised even in the face of perfect technological imitation remaining its core objective.

METHODOLOGICAL FRAMEWORK FOR DIGITAL AUTHENTICITY

In the era of artificial intelligence, ensuring the authenticity and evidential integrity of digital content necessitates a methodical approach that combines technical verification, contextual documentation, and procedural guarantees. To standardise these processes, the proposed Digital Authenticity Framework (D-AUTH) expands upon ENFSI, INTERPOL, and Eurojust best practices.

Creating a forensic image, using cryptographic hashing (SHA-256, for example), and using write-blocking to preserve the original data are the first steps in the procedural level of authenticity. In addition to contextual records that describe the operating environment, including system versions, configurations, timestamps, and network conditions, each version of the evidence must be recorded within a verified chain of custody (ENFSI, 2021; INTERPOL, 2021). Researchers should also note model version, build identifier, and dataset references that affect results when AI systems are used (Eurojust/eu-LISA, 2022).



The second pillar is provenance verification. The origin and editing history of a file are documented by cryptographically signed metadata frameworks like the C2PA Content Credentials Standard (Coalition for Content Provenance and Authenticity, 2024). Although provenance by itself does not establish veracity, “soft provenance” indicators, such as server logs, CDN records, or first-seen timestamps, may assist authenticity assessments in the absence of such credentials.

Global and local analysis, error-level mapping, photo-response non-uniformity (PRNU), statistical feature extraction, and heat-map visualisation are among the blind and knowledgeable forensic techniques that are integrated into the analytical stage. To increase the probative value, results should, whenever feasible, be cross-checked with independent traces like geolocation, focal length, illumination, or telecom data.

Algorithmic auditability and configuration transparency are crucial for AI-based forensic tools. Model version, reproducibility seed, robustness testing, and probabilistic, rather than binary results, must all be included in the documentation. Forensic reliability includes the explicit recognition of uncertainty. Reproducibility also necessitates that all parameters and processes be adequately documented to enable independent replication by a different specialist.

Thus, the D-AUTH framework combines procedural integrity, forensic detection, and provenance control into a single digital authenticity model. Through the integration of these principles into investigative and judicial processes, criminalistics can preserve the epistemological underpinnings of truth in the age of algorithmic mediation by converting authenticity from a presumption into a verifiable, reproducible, and demonstrable attribute of digital evidence. The D-AUTH framework thus operationalises the core forensic triad of identification, authenticity, and chain-of-custody within AI-mediated environments.

CONCLUSION

One of the most revolutionary developments in criminalistics is the transformation of the digital traces from the end of last century into artificial intelligence in recent years. It has changed the creation, preservation, and interpretation of traces, thereby changing the epistemological underpinnings of the field. The digital trace was once a reliable and verifiable source of information, but it now exists in a dynamic environment where authenticity cannot be assumed.

AI forces important criminalistic ideas to be redefined. It is important to consider the trace as a reflection of an event, as well as a possible algorithmic generation product that could mimic or warp reality. As a result, informational and algorithmic aspects must be incorporated into conventional theories of trace and formatting evidence. “What does the trace reveal?” has given way to “Is the trace real?” as the central epistemological query in criminalistics. Historically, however, such problems have been partially addressed by criminalistics in the past.

Verification frameworks must take algorithmic mediation into consideration in order to address this, assessing digital trace for both its technical integrity and the dependability of the systems that generated it. Multilayered validation that integrates technical, analytical, and interpretative evaluation takes the place of physical verification of classic material traces.

In practice, artificial intelligence (AI) improves analytical ability by processing large datasets and uncovering hidden relationships, but it also poses risks by producing fake or modified traces. Thus, an augmented judgment paradigm - where algorithmic accuracy complements but never takes the place of human expertise and accountability - is necessary to preserve evidential legitimacy.



Labels like “authentic” or “fake” are no longer adequate. Explicit uncertainty estimation must be used to support probabilistic, transparent, and repeatable reasoning in modern criminalistics. Three complementary layers must be integrated for verification to be sustainable:

1. Provenance assurance through the use of audit and cryptographic signatures;
2. Multimodal detection and cross-verification of independent traces in criminalistics content analysis;
3. Maintaining chain-of-custody contextual documentation, and secure hashing is known as procedural integrity.

These guidelines are based on the Council of Europe Framework Convention on AI and the EU Artificial Intelligence Act, which together set moral and legal guidelines for the responsible application of AI in criminalistics. Even in a time when imitation and reality are becoming more and more similar, digital traces can maintain their evidential credibility by fusing technological accuracy, methodological openness, and normative accountability.

The study emphasises that every digital trace must be examined both technically and as a component of cognition - a carrier of knowledge about the event itself - in accordance with the epistemological framework of criminalistics.

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SECURITY CHALLENGES OF APPLYING ICT AND AI IN DIVERSIFICATION

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ABSTRACT

Purpose: The integration of Information and Communication Technology (ICT) and Artificial Intelligence (AI) in diversification strategies has become crucial for economic and industrial development. However, this integration introduces significant security challenges that threaten sustainable growth. This study explores the security risks associated with ICT and AI in diversification, identifying vulnerabilities, threats, and potential mitigation strategies.

Design/Methods/Approach: A mixed-methods approach was employed, combining a comprehensive literature review, case studies from healthcare, finance, and manufacturing sectors, and expert interviews with cybersecurity professionals, AI ethicists, and ICT infrastructure specialists. The study systematically analyses security challenges and proposes actionable solutions.

Findings: The research highlights key security challenges, including data breaches, ransomware attacks, adversarial AI exploitation, ethical concerns (such as algorithmic bias), and vulnerabilities in legacy systems. Case studies demonstrate real-world impacts, while expert insights emphasise the need for proactive cybersecurity measures, ethical AI governance, and infrastructure modernization.

Originality/Value: This study contributes to the existing literature by providing a holistic analysis of security challenges in ICT and AI-driven diversification. It offers practical mitigation strategies, such as enhanced encryption, AI adversarial testing, network segmentation, and security culture development. The findings are valuable for policymakers, industry leaders, and cybersecurity professionals seeking to balance innovation with risk management in digital transformation.

Keywords: diversification, security challenges, cybersecurity, Information and Communication Technology (ICT), Artificial Intelligence (AI)

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INTRODUCTION

Diversification is a widely-used strategy in economic development, industrial expansion, and technological innovation, aimed at reducing risk and enhancing resilience. In economic terms, diversification allows organisations and countries to spread their investments across various markets or sectors, thereby minimizing their dependence on a single industry or revenue stream. This not only cushions against market fluctuations but also opens up new avenues for growth and innovation. Technological diversification, particularly through the integration of Information and Communication Technology (ICT) and Artificial Intelligence (AI), has had a profound impact on industries by enabling smarter decision-making, streamlining operations, and enhancing overall productivity (Schneier, 2015).

The application of ICT — spanning from communication networks to data storage and processing — and AI, which includes machine learning, predictive analytics, and automation, has significantly transformed business operations. Through these technologies, organisations can access real-time data, perform more accurate trend analysis, and implement automation that drives innovation in product development and service delivery (Goodfellow et al., 2016). These technological advancements have allowed companies to expand into new markets, improve resource allocation, and optimize their operations. However, with the promise of greater efficiency and innovation comes a heightened level of exposure to security risks.

The growing reliance on ICT and AI has brought about significant security challenges, such as data breaches, cyber-attacks, and ethical concerns surrounding AI-driven decisions. These issues pose risks not only to organisations but also to individuals, raising concerns about privacy violations, data misuse, and vulnerabilities in AI systems that could be exploited by malicious actors (Tavani, 2016). As businesses continue to adopt these technologies for diversification, they must carefully address the security vulnerabilities that may compromise the benefits of technological advancements (Schneier, 2015).

Given the evolving landscape of ICT and AI adoption in diversification strategies, this study seeks to answer the following questions: what are the primary security challenges of applying ICT and AI in diversification, and how can they be effectively mitigated? These research questions explore the multidimensional security risks tied to the application of ICT and AI, focusing on their integration in the diversification process across various industries. Understanding these challenges is crucial for businesses to ensure they can continue to leverage technological innovations without compromising their security posture.

The primary objectives of this study are as follows:

- To identify and categorize the security challenges associated with the use of ICT and AI in the context of diversification. This involves examining both the technical and organisational factors that contribute to these challenges;



- To analyse the impact of these challenges across various sectors. Different industries, such as healthcare, finance, manufacturing, and retail, face unique security threats due to their reliance on ICT and AI (Verizon, 2021);
- To propose mitigation strategies that organisations can employ to address these security challenges effectively. These strategies will aim to enhance the resilience of organisations while enabling them to take full advantage of the benefits that ICT and AI can offer.

This research employs a mixed-methods approach to gather comprehensive insights into the security challenges associated with the application of ICT and AI in diversification. The research methodology includes:

- **Literature Review:** the literature review will synthesize the existing research on ICT, AI, and their associated security challenges. This section aims to provide a theoretical foundation for understanding how these technologies interact with the security landscape;
- **Case Studies:** real-world examples of security breaches and challenges from industries that have adopted ICT and AI will be analysed. These case studies will offer practical insights into the vulnerabilities that organisations face and how they respond to security incidents (Anderson, 2020).
- **Expert Interviews:** interviews with industry professionals, cybersecurity experts, and technology practitioners will validate findings from the literature and case studies. The interviews will provide practical, real-world perspectives on the security challenges and mitigation strategies that organisations utilize.

LITERATURE REVIEW

The integration of Information and Communication Technology (ICT) and Artificial Intelligence (AI) into diversification strategies has been a subject of extensive research. This section reviews the existing literature on the role of ICT and AI in diversification, the security challenges associated with these technologies, and the gaps in current research.

ICT and AI in Diversification

ICT and AI have become indispensable tools for organisations seeking to diversify their operations, whether in economic, industrial, or technological contexts. ICT facilitates communication, data processing, and information management, enabling organisations to streamline operations and explore new markets (Goodfellow et al., 2016). AI, on the other hand, enhances decision-making through predictive analytics, machine learning, and automation, allowing organisations to optimize resource allocation and develop innovative products (Schneier, 2015).

The application of ICT and AI in diversification has been particularly transformative in sectors such as healthcare, finance, and manufacturing. For example, in healthcare, AI-powered diagnostic tools have improved patient outcomes, while ICT systems have enhanced data sharing and collaboration among healthcare providers (Verizon, 2021). In the financial sector, AI algorithms are used for fraud detection and risk management, while ICT systems enable real-time transaction processing and customer engagement (Stallings, 2017). In manufacturing, ICT and AI have been leveraged to optimize production processes, reduce waste, and improve product quality (Anderson, 2020).

Despite these benefits, the integration of ICT and AI into diversification strategies is not without challenges. The reliance on these technologies introduces significant security risks, which can undermine the benefits of diversification if not properly addressed.



Security Challenges in ICT and AI

The security challenges associated with ICT and AI are multifaceted and evolving. These challenges can be broadly categorized into data security and privacy concerns, cyber-attacks, AI-driven threats, ethical and legal issues, and infrastructure vulnerabilities.

Data security and privacy are among the most pressing concerns in the application of ICT and AI. The vast amounts of data collected and processed by these technologies make them attractive targets for cybercriminals. Data breaches can result in the loss of sensitive information, financial losses, and reputational damage (Schneier, 2015). Additionally, the use of AI in data analysis raises privacy concerns, as AI algorithms often require access to personal data to function effectively. This can lead to violations of privacy rights and regulatory non-compliance (Tavani, 2016).

Cyber-attacks, such as ransomware and phishing, pose significant threats to organisations that rely on ICT and AI. Ransomware attacks, which encrypt data and demand a ransom for its release, have become increasingly common and can cripple operations (Verizon, 2021). Phishing attacks, which exploit human vulnerabilities to gain unauthorised access to systems, have also become more sophisticated, making them harder to detect and prevent (Stallings, 2017).

AI-driven threats, such as adversarial attacks and AI-powered cyber-attacks, are emerging challenges in the security landscape. Adversarial attacks involve manipulating AI algorithms to produce incorrect results, undermining the reliability of AI systems (Goodfellow et al., 2016). AI-powered cyber-attacks, on the other hand, leverage AI to enhance the effectiveness of malware and other malicious tools, making them more difficult to defend against (Anderson, 2020).

The use of AI in decision-making raises ethical and legal concerns, particularly regarding bias and accountability. AI algorithms can exhibit bias, leading to unfair or discriminatory outcomes, which can result in legal challenges and reputational damage (Tavani, 2016). Additionally, the use of AI in decision-making raises questions about accountability, as it can be challenging to determine who is responsible for a wrong decision — the developer, the user, or the AI itself (Bishop, 2019).

Infrastructure vulnerabilities, such as those associated with legacy systems and interconnected networks, also pose significant security challenges. Legacy systems, which are often not designed to handle modern security threats, are particularly vulnerable to cyber-attacks (Anderson, 2020). The interconnected nature of ICT and AI systems creates additional vulnerabilities, as a security breach in one system can potentially compromise the entire network (Stallings, 2017).

Gaps in Current Research

While there is a substantial body of research on the security challenges associated with ICT and AI, there are several gaps in the literature. First, much of the existing research focuses on specific threats, such as ransomware or phishing, rather than taking a holistic approach to security (Verizon, 2021). Second, there is limited research on the security challenges of applying ICT and AI in the context of diversification, particularly in emerging sectors such as renewable energy and smart cities. Third, there is a need for more research on the ethical and legal implications of AI in diversification, particularly regarding bias and accountability (Tavani, 2016).

Theoretical Frameworks

Several theoretical frameworks have been proposed to address the security challenges associated with ICT and AI. These include the CIA triad (Confidentiality, Integrity, Availability), which provides a



foundation for understanding data security (Stallings, 2017), and the AI ethics framework, which emphasises transparency, fairness, and accountability in AI decision-making (Tavani, 2016). Additionally, the Zero Trust model, which assumes that no user or system can be trusted by default, has gained traction as a strategy for mitigating cyber threats in interconnected systems (Anderson, 2020).

The literature review highlights the transformative potential of ICT and AI in diversification, as well as the significant security challenges associated with these technologies. While there is a substantial body of research on specific threats, such as data breaches and cyber-attacks, there is a need for more holistic research on the security challenges of applying ICT and AI in diversification. Additionally, there is a need for further research on the ethical and legal implications of AI, particularly in the emerging sectors. The next section of this article will explore these challenges in greater detail, drawing on case studies and expert interviews to provide practical insights and actionable solutions.

SECURITY CHALLENGES OF APPLYING ICT AND AI IN DIVERSIFICATION

The increasing reliance on Information and Communication Technology (ICT) and Artificial Intelligence (AI) as part of diversification strategies introduces a wide range of security challenges. These challenges are multifaceted, spanning across data protection, cyber-attacks, AI-specific vulnerabilities, ethical and legal concerns, and infrastructural weaknesses. Addressing these challenges is vital for organisations to effectively leverage ICT and AI for diversification without compromising security or integrity (Schneier, 2015; Anderson, 2020).

Data Security and Privacy

As organisations integrate ICT and AI into their operations, one of the most pressing security challenges is safeguarding data. The vast volumes of sensitive and personal data processed by these technologies make them prime targets for cybercriminals (Tavani, 2016).

Data breaches have become an increasingly common threat to organisations using ICT and AI, as both technologies handle large-scale data processing. These data often include personally identifiable information (PII), financial records, health information, and intellectual property, making it highly valuable to attackers. A data breach can lead to the unauthorised disclosure of sensitive data, potentially resulting in financial losses, identity theft, and damage to the organisation's reputation. Organisations may face legal consequences due to violations of data protection laws like the General Data Protection Regulation (GDPR) and others. The complexity of modern ICT systems, combined with AI's ability to analyse and integrate vast data sets, increases the attack surface, making it difficult to secure sensitive information effectively (Schneier, 2015).

AI's reliance on large datasets, including personal and behavioural data, raises significant privacy concerns. Many AI systems require access to personal data to function effectively — such as data on user preferences, health status, or location — creating risks related to privacy rights. For example, AI-driven personalized services in the retail or healthcare sectors may inadvertently violate privacy regulations if not properly managed. Striking the balance between leveraging AI to improve services and ensuring that individual privacy is protected is a fundamental challenge for organisations. The ethical implications of AI usage in processing sensitive personal data must be carefully navigated, with organisations ensuring they comply with global privacy standards (Tavani, 2016).



Cyber-Attacks

As the application of ICT and AI expands, so do the risks posed by cyber-attacks. These attacks target the infrastructure and data processed by these technologies, and their sophistication has grown, especially with the integration of AI into the cyber-attack strategies (Verizon, 2021).

Ransomware is one of the most significant cyber threats to organisations leveraging ICT and AI. In a ransomware attack, malicious actors encrypt an organisation's data and demand a ransom for its release. For organisations using AI to process or automate critical business functions, these attacks can cause severe operational disruptions. For instance, in sectors such as healthcare, where AI is used for diagnostic tools or patient management, ransomware attacks could paralyse vital systems, leading to delays in patient care and potentially endangering lives. Financially, the cost of such attacks extends beyond the ransom itself, as organisations may also face long-term reputational damage and a loss of consumer trust (Verizon, 2021).

Phishing attacks exploit human vulnerabilities to gain unauthorised access to systems and data. These attacks typically involve deceptive emails or messages designed to trick recipients into revealing sensitive information, such as passwords or financial details. The growing sophistication of phishing tactics — especially those enhanced by AI — makes them harder to detect and prevent. AI can be used by attackers to generate highly convincing phishing messages that mimic legitimate communications. For example, AI systems can analyse an individual's communication patterns to craft personalized phishing attempts, increasing the likelihood of a successful attack. As organisations implement AI-driven systems for communication, phishing attacks become even more dangerous (Stallings, 2017).

AI-Driven Threats

The security risks associated with AI are unique, as adversaries can exploit vulnerabilities inherent in AI systems themselves. These threats can undermine the integrity of AI-driven decision-making, leading to incorrect or harmful outcomes (Goodfellow et al., 2016).

Adversarial attacks involve manipulating input data in a way that causes AI systems to make incorrect predictions or decisions. These attacks exploit the weaknesses in machine learning models by introducing small, often imperceptible changes to the data fed into the system. For example, an attacker could manipulate image recognition software by subtly altering input images so that the AI misidentifies objects, which could have dire consequences in applications like autonomous vehicles or medical diagnostics. The potential to mislead AI systems with adversarial inputs poses a significant challenge for organisations that rely on AI for critical decision-making (Goodfellow et al., 2016).

AI itself can be used to enhance the sophistication and effectiveness of cyber-attacks. AI-powered malware can adapt to avoid detection by traditional security measures, such as antivirus software, by continuously learning and evolving its tactics. For example, an AI-driven virus can change its code to bypass signature-based detection systems, rendering conventional defence mechanisms less effective. As cybercriminals adopt AI tools, the overall cybersecurity landscape becomes more challenging, requiring organisations to constantly innovate and update their defences to stay ahead of these evolving threats (Anderson, 2020).

Ethical and Legal Challenges

In addition to technical security challenges, organisations also face ethical and legal concerns when integrating AI and ICT into their diversification strategies. These concerns stem from the potential misuse of AI and the accountability of decisions made by AI systems (Tavani, 2016; Bishop, 2019).



AI systems, especially machine learning algorithms, are trained on large datasets. If these datasets contain biased or unrepresentative data, AI models may perpetuate or even amplify these biases in their decision-making. This can lead to unfair outcomes, such as discriminatory practices in hiring, loan approvals, or law enforcement. For example, a biased AI model in hiring could result in systemic discrimination against certain demographic groups, leading to legal challenges. This bias is not always easily detectable, which complicates efforts to ensure fairness in AI systems. Thus, addressing algorithmic bias is critical to maintaining both the ethical integrity and legal compliance of AI-driven systems (Tavani, 2016).

As AI systems increasingly take on decision-making roles, determining accountability in the case of errors or unethical behaviour becomes a complex issue. If an AI system makes a wrong decision, such as denying a loan or misdiagnosing a patient, who is responsible? Is it the developer, the user, or the AI itself? This ambiguity in accountability can lead to legal disputes and a lack of trust in AI systems. Organisations must establish clear guidelines and frameworks to address accountability in AI decision-making processes to mitigate these risks (Bishop, 2019).

Infrastructure Vulnerabilities

While ICT and AI offer significant advantages, they also expose infrastructure to new vulnerabilities that could be exploited by attackers (Anderson, 2020; Stallings, 2017).

Many organisations still rely on legacy systems that were not designed to handle the complex security challenges posed by modern ICT and AI technologies. These older systems often lack the necessary updates and security patches to defend against current cyber threats. Additionally, legacy systems are sometimes incompatible with newer AI-driven solutions, creating gaps in security that cybercriminals can exploit. The inability to integrate legacy systems with advanced security measures poses a serious risk to organisations adopting AI and ICT for diversification (Anderson, 2020).

The interconnected nature of modern ICT and AI systems creates additional vulnerabilities. In today's digital ecosystem, a breach in one part of the system can potentially compromise an entire network. The widespread use of cloud services, interconnected devices (IoT), and shared data infrastructures increases the attack surface, making it easier for attackers to access multiple systems at once. Organisations must ensure that their networks are segmented and that robust security protocols are in place to prevent lateral movement of attackers across the entire infrastructure (Stallings, 2017).

CASE STUDIES

To further understand the security challenges associated with the application of ICT and AI in diversification, we examine several high-profile case studies from different sectors. These case studies highlight the vulnerabilities that arise when these technologies are integrated into critical industries, illustrating both the immediate impact and the long-term consequences of security breaches.

Case Study 1: Healthcare Sector

The healthcare sector has increasingly turned to ICT and AI to enhance patient care, improve diagnosis accuracy, and streamline operational workflows. AI applications, such as predictive analytics, are used to identify health trends, while ICT systems manage patient data and communication. However, this digital transformation also exposes the sector to a variety of cyber threats.



A significant case in point is the WannaCry ransomware attack in May 2017, which affected health-care institutions globally, including the UK's National Health Service (NHS). The attack encrypted critical data and demanded a ransom payment for its release, crippling hospital systems and delaying patient care. The attack highlighted the vulnerabilities in healthcare ICT infrastructures, especially those that were running outdated software, such as Windows XP, which had not been updated with critical security patches. The WannaCry incident underscored the risks associated with legacy systems in healthcare and illustrated how cyber-attacks could disrupt services, jeopardize patient safety, and damage institutional reputations (Verizon, 2021).

Security Challenges:

- **Legacy Systems:** many healthcare organisations continue to rely on outdated systems that are susceptible to cyber-attacks.
- **Critical Data Protection:** healthcare organisations must implement robust security measures to protect sensitive patient data from breaches.

Case Study 2: Financial Sector

The financial sector has been at the forefront of leveraging AI for fraud detection, credit scoring, and risk management. AI models, including machine learning and deep learning algorithms, help detect unusual patterns in transactions and predict potential financial crimes. However, these advancements have also made financial institutions a prime target for cybercriminals seeking to exploit vulnerabilities. One of the most notable security breaches in the financial sector was the 2017 Equifax data breach. Hackers exploited a vulnerability in Equifax's web application software to gain unauthorised access to sensitive personal and financial data of approximately 147 million Americans. The breach exposed highly sensitive information, including Social Security numbers, birth dates, and addresses. The attack highlighted the growing risks associated with data storage and the challenges in securing vast amounts of financial and personal data, especially as more institutions adopt AI-driven systems for risk analysis and customer management (Schneier, 2015).

Security Challenges:

- **Data Protection:** the breach revealed how crucial it is for financial institutions to implement robust security measures, including encryption, data anonymisation, and advanced threat detection.
- **AI in Fraud Prevention:** AI algorithms used for fraud detection may not be sufficient on their own without complementary human oversight, and a breach could render these systems ineffective.

Case Study 3: Manufacturing Sector

The manufacturing industry has increasingly incorporated ICT and AI into its operations to improve production efficiency, optimise supply chains, and ensure product quality. AI-driven systems monitor production lines, predict maintenance needs, and enhance automation. However, these advancements have also created new vulnerabilities.

A striking example is the 2014 cyber-attack on a German steel mill, where attackers infiltrated the control systems of the facility and caused significant physical damage. The cyber-attack was reportedly launched through a vulnerability in the plant's IT infrastructure, which had been connected to external networks. The attackers gained control over the system, causing the furnace to malfunction and leading to extensive physical damage. This incident marked one of the first known cases where a cyber-attack resulted in direct physical harm to a critical industrial facility. The breach exposed the



risks associated with the interconnectedness of industrial control systems and highlighted how cyber-attacks could directly disrupt manufacturing processes and result in substantial financial losses (Anderson, 2020).

Security Challenges:

- **Industrial Control Systems:** manufacturing plants that rely on outdated or unprotected industrial control systems are vulnerable to cyber-attacks that can result in physical damage.
- **Interconnected Systems:** the attack demonstrated the risks of interconnectedness between industrial control systems and external networks, emphasising the need for secure network segmentation.

EXPERT INTERVIEWS

In addition to case studies, expert insights from professionals in cybersecurity, AI ethics, and ICT infrastructure provide valuable perspectives on the security challenges organisations face when applying ICT and AI in diversification. These interviews underscore the importance of a proactive, multidisciplinary approach to addressing the risks associated with these technologies.

Interview with Cybersecurity Expert

A cybersecurity expert emphasised the importance of adopting a proactive security posture to address the evolving nature of cyber threats in ICT and AI environments. They highlighted several key strategies for mitigating risks:

- **Continuous Monitoring:** organisations should continuously monitor network activity and use advanced threat detection systems to identify and respond to potential security breaches;
- **Threat Intelligence:** staying informed about emerging threats and vulnerabilities, particularly in relation to AI-driven cyber-attacks, is crucial for effective defence;
- **Employee Training:** since human error is often a significant factor in cyber breaches, organisations must invest in ongoing employee training to ensure all staff members understand best practices for cybersecurity (Stallings, 2017).

Key Recommendation: a layered security strategy that incorporates both technology and human factors is essential for safeguarding ICT and AI systems from evolving cyber threats.

Interview with AI Ethicist

An AI ethicist discussed the growing importance of addressing the ethical implications of AI in diversification. As AI becomes more deeply integrated into decision-making processes across various sectors, organisations must ensure transparency, fairness, and accountability in their AI systems. They noted the following:

- **Transparency:** organisations must ensure that AI algorithms are explainable and that the decision-making process is transparent to avoid mistrust;
- **Fairness:** AI models must be developed and trained in a way that avoids biases, especially in sectors such as healthcare and finance, where biased decisions can have significant legal and social consequences;
- **Accountability:** if AI systems make a wrong or harmful decision, it is essential to establish clear accountability frameworks to determine responsibility — whether it lies with the developers, the users, or the AI system itself (Tavani, 2016).



Key Recommendation: ethical AI practices should be a core component of any organisation's strategy when adopting AI for diversification, ensuring that systems are not only secure but also aligned with ethical standards.

Interview with ICT Infrastructure Specialist

An ICT infrastructure specialist provided insights into the challenges of securing legacy systems and modernizing infrastructure to accommodate the demands of AI and ICT. Key takeaways included:

- **Securing Legacy Systems:** many organisations still depend on outdated infrastructure that lacks the security protocols necessary to protect against modern cyber threats. The specialist stressed the importance of regular updates and patches to safeguard these systems;
- **Modernization and Network Segmentation:** for organisations to safely integrate AI, they must modernize their infrastructure, implement robust access control mechanisms, and ensure network segmentation to limit the potential impact of a security breach (Anderson, 2020).

Key Recommendation: Organisations must prioritize the secure modernization of their ICT infrastructure, particularly by addressing vulnerabilities in legacy systems and implementing strategies such as network segmentation to limit the scope of cyber risks.

MITIGATION STRATEGIES

To address the security challenges associated with applying ICT and AI in diversification, organisations must adopt comprehensive mitigation strategies. These strategies should span multiple levels of an organisation, from enhancing data security to fostering a culture of cybersecurity awareness. Below are several key areas in which organisations can strengthen their defences.

Enhancing Data Security

Data security is the foundation of any cybersecurity strategy, especially when dealing with sensitive information processed through ICT and AI systems. Ensuring that data are properly protected helps reduce the risk of breaches, safeguarding both individual privacy and organisational integrity.

Encryption is a fundamental tool for protecting data from unauthorised access. By encrypting data both at rest (stored data) and in transit (data being transmitted), organisations can ensure that even if data are intercepted, they remain unreadable. Strong encryption protocols, such as AES-256, should be used to safeguard personal, financial, and operational data. Additionally, encryption can help organisations comply with regulations such as GDPR and HIPAA, which mandate data protection (Schneier, 2015).

Implementing strict access control mechanisms is essential to prevent unauthorised access to sensitive data. Multi-factor authentication (MFA) should be used to verify users' identities before granting access, and role-based access control (RBAC) can restrict access based on the user's role within the organisation. This ensures that only authorised personnel can view or modify sensitive data, reducing the risk of insider threats and data breaches (Stallings, 2017).

Strengthening Cybersecurity Measures

As cyber threats continue to evolve, organisations must adopt more sophisticated cybersecurity measures to protect their ICT and AI infrastructures. Threat intelligence, incident response planning, and continuous monitoring are crucial components of a proactive cybersecurity strategy.



Threat intelligence involves collecting and analysing data about emerging threats and vulnerabilities. This helps organisations stay one step ahead of potential attackers by identifying new attack vectors and trends in cyber-attacks. By leveraging threat intelligence platforms and sharing information with industry groups, organisations can anticipate cyber threats and develop defensive strategies tailored to their needs (Anderson, 2020).

Having a well-defined incident response plan is vital for minimizing the impact of a security breach. This plan should outline clear roles and responsibilities, ensuring that key stakeholders are identified and prepared to act swiftly. Regular incident response drills should be conducted to ensure that the team can respond effectively to different types of attacks. The ability to quickly detect, contain, and recover from a security incident can significantly reduce potential damages (Bishop, 2019).

Addressing AI-Driven Threats

AI-driven threats present unique challenges, particularly as cybercriminals increasingly exploit AI to enhance the sophistication of their attacks. At the same time, AI systems themselves may be vulnerable to adversarial attacks, which can undermine their reliability.

To mitigate the risks associated with AI-driven threats, organisations should conduct robust testing of AI algorithms before deployment. This includes adversarial testing, where AI systems are exposed to manipulated data designed to trick or confuse the system. By identifying vulnerabilities in AI models before they are deployed, organisations can improve their resilience against attacks that seek to exploit these weaknesses (Goodfellow et al., 2016).

Addressing the ethical implications of AI is critical for ensuring that AI systems are fair, transparent, and accountable. Organisations should develop and implement AI ethics frameworks that guide the design, development, and deployment of AI systems. These frameworks should focus on mitigating algorithmic bias, ensuring transparency in decision-making, and establishing accountability for AI-driven outcomes. By doing so, organisations can avoid ethical pitfalls and ensure that their AI systems promote fairness and equity (Tavani, 2016).

Modernizing Infrastructure

Legacy systems, often ill-equipped to handle modern cyber threats, are a significant security risk. Organisations must prioritize the modernization of their IT infrastructure to ensure that they can fully secure their systems in the context of ICT and AI-driven diversification.

Upgrading legacy systems to modern, secure platforms is crucial for reducing vulnerabilities. Legacy systems may lack the necessary security patches, encryption protocols, and access controls to protect against current cyber threats. While upgrading these systems requires a significant investment, it is a necessary step in ensuring long-term security. Additionally, organisations should conduct regular audits to ensure that any remaining legacy systems are isolated from critical infrastructures (Anderson, 2020).

Network segmentation is the practice of dividing a network into smaller, isolated segments, which can limit the spread of a security breach. For example, sensitive data or AI systems could be separated from less critical network segments to reduce the impact of a compromise. By implementing network segmentation, organisations can contain attacks more effectively, preventing them from spreading across the entire network and reducing the overall risk (Stallings, 2017).



Promoting a Security Culture

One of the most effective ways to mitigate security challenges is to foster a security-conscious culture within the organisation. This involves training employees, setting clear cybersecurity priorities, and ensuring leadership commitment.

Human error is often the weakest link in an organisation's security defences. Regular employee training is essential to ensure that staff members can recognize and respond to potential threats, such as phishing attempts, social engineering attacks, and unsafe online practices. Training should be tailored to different roles within the organisation and should include hands-on exercises that simulate real-world security threats (Bishop, 2019).

A commitment to cybersecurity from the highest levels of leadership is crucial for creating a security-focused organisation. Leaders must allocate sufficient resources to cybersecurity initiatives, set clear priorities, and lead by example. When leadership demonstrates a strong commitment to cybersecurity, it helps cultivate a culture where all employees understand the importance of protecting organisational assets and information (Schneier, 2015).

CONCLUSION

The application of ICT and AI in diversification offers immense potential for innovation and growth. However, it also introduces significant security challenges that must be addressed to ensure sustainable development. This article has identified and analysed the primary security challenges, including data security, cyber-attacks, AI-driven threats, ethical and legal concerns, and infrastructure vulnerabilities. Through case studies and expert interviews, we have provided practical insights into these challenges and proposed mitigation strategies.

Addressing these security challenges requires a holistic approach that combines technological solutions, ethical considerations, and organisational commitment. By enhancing data security, strengthening cybersecurity measures, addressing AI-driven threats, modernizing infrastructure, and promoting a security culture, organisations can mitigate the risks and fully leverage the benefits of ICT and AI in diversification.

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ENVIRONMENTAL CRIME AND THE GEOPOLITICS: PROVING RESPONSIBILITY IN GLOBAL CHAINS OF POWER

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ABSTRACT

Purpose: Environmental crime today represents one of the most complex forms of modern criminal activity, as it transcends the boundaries of classical law and encompasses economic, political, and scientific dimensions. The paper aims to explore how these interconnections shape legal and institutional responses to environmental offenses and to highlight the growing importance of scientific evidence in proving responsibility.

Design/Methods/Approach: The paper is based on a qualitative and analytical approach, combining theoretical, legal, and ethical perspectives. It does not include empirical measurement or field data but analyzes the role and potential of scientific methods, such as forensic ecology, satellite monitoring, and data analysis, in establishing environmental responsibility. The approach is conceptual and comparative, focusing on international cases, institutional frameworks, and the epistemological limits of scientific evidence.

Findings: The analysis shows that environmental crime functions as a transnational and institutionalized phenomenon, in which responsibility is often diffused among corporate and governmental actors. Control mechanisms remain fragmented, and the causal links between actions and consequences are frequently indirect or obscured. Based on a review of legal frameworks and international practice, the study concludes that proving responsibility requires the integration of scientific verification models, stronger institutional cooperation, and a global approach to environmental accountability.

Originality/Value: The conclusion is based on the thesis that researching and proving environmental crime requires a new paradigm founded on scientific integration and the ethics of responsibility, in which scientific institutions, states, and international organizations share joint accountability for preserving sustainable justice and global security.

Keywords: environmental crime, resources, responsibility, scientific approaches, geopolitics, sustainability, environmental forensics

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INTRODUCTION – ENVIRONMENTAL CRIME AS A CIVILIZATIONAL CHALLENGE

The contemporary world faces a form of criminality that transcends all previous boundaries of law and politics. Environmental crime is no longer a marginal phenomenon but a central symptom of the global order in which economy, technology, and power have lost their limits, while responsibility has remained local and fragmented. The destruction of natural systems has become a by-product of a development model still based on the unlimited exploitation of natural resources, rather than on sustainability. In this context, crime is manifested not only as a conscious violation of the law but as a systemic pattern of action embedded in the very logic of global production and consumption.

Whereas in the past environmental offenses had clearly defined perpetrators, today’s forms of pollution and degradation represent collective and diffuse processes involving states, corporations, international financial institutions, and markets. The boundary between what is legal and what is legitimate is becoming increasingly blurred: what is formally permitted is often morally and ecologically unacceptable. This raises a fundamental question — how can responsibility be proven when guilt is dispersed, when harm develops slowly, and when the system is simultaneously both the cause and the judge?

Environmental crime is therefore not merely a matter of law but a question of civilizational self-awareness. It reveals the relationship of society toward knowledge, truth, and responsibility. In a world where environmental consequences are globalized while legal norms remain national, a deep gap emerges between cause and sanction. Science possesses all the instruments to identify the source of harm, yet law lacks the strength to transform that truth into justice. Politics, on the other hand, often instrumentalizes both science and law to postpone confrontation with reality.

The purpose of this paper is to examine the scientific, legal, and ethical foundations of establishing responsibility for environmental crime in the global context. The focus is not on individual cases but on mechanisms that enable impunity and the transfer of environmental harm from weaker to stronger actors. The paper is based on the hypothesis that, under contemporary conditions, environmental crime can be proven only through the integration of three systems of truth: scientific, legal, and ethical, since each of them alone has limited reach.

The paper seeks to demonstrate that establishing environmental responsibility is not merely a technical process but an act of moral and political courage. For truth to have the power of proof, it must



be public, verifiable, and accountable. Scientific data without institutional support remain a mute testimony, while law without science remains a formal procedure devoid of substance. In this union, science becomes a moral instrument, law a social framework, and responsibility – the common foundation of survival.

SCIENTIFIC EVIDENCE AND THE LIMITS OF TRUTH

Proving responsibility for environmental crime today depends on the ability of science to identify and verify traces of harm within complex natural and social systems. In this process, scientific evidence ceases to be merely a technical instrument and becomes a form of social truth — a truth that must withstand both laboratory verification and public scrutiny. Environmental offenses cannot be viewed through classical cause-and-effect frameworks, as their dynamics are nonlinear. Pollution accumulates, effects appear with delay, and responsibility becomes lost within a chain of companies, institutions, and jurisdictions.

Environmental forensics, toxicology, and remote sensing have become key disciplines in establishing evidence. The analysis of soil, water, and biological samples enables the identification of pollutants as well as the mapping of the spatial distribution of damage. Satellite monitoring and GIS systems make it possible to reconstruct events with a precision previously unattainable: changes in terrain, deforestation, alterations in water color — all such data become material traces. However, precision does not equate to legal certainty. A scientific finding must be transformed into evidence through a process of verification and interpretation, which is simultaneously a methodological and political act.

In the past decade, a new type of evidence has emerged — the algorithmic proof. Through the use of large datasets and machine learning models, it has become possible to detect irregularities in waste trade, energy flows, and industrial production. These models can reveal patterns of criminal behavior before they are formally recorded, yet they raise the question of reliability. When an algorithm becomes a witness, the question arises: who is responsible for its interpretation? Scientific truth, paradoxically, can be lost in the complexity of its own methods.

The essential limitation of scientific evidence lies not in its accuracy, but in the lack of shared standards. Sampling methodologies, validation of results, and interpretation of data vary across states and institutions. This disrupts the continuity of the chain of evidentiary legitimacy — from sample to verdict. In international investigations, even the principles of measurement are often contested, and truth loses its universality, becoming dependent on jurisdiction. Scientific evidence thus becomes a mirror of political power: where institutions possess legitimacy, truth is accepted; where they do not, science becomes an object of doubt.

In this sense, proving environmental crime involves not only measuring damage but also establishing trust in the measure itself. Forensic accuracy and institutional independence must be united in a single system that allows facts to become legal facts. Scientific evidence, without an ethical and procedural framework, remains information without consequence. To have real force, it must be publicly verifiable, repeatable, and accessible. From this arises the concept of epistemological responsibility — the responsibility of science to make truth effective.



STRUCTURAL PATTERNS AND THE GEOPOLITICS OF RESOURCES

Environmental crime does not arise from the absence of law but from the structure of the global economy, in which profit and power take precedence over sustainability. The exploitation of natural resources has become the foundation of political and financial power and, consequently, a source of systemic injustice. Countries rich in raw materials are often simultaneously the most affected by environmental degradation, as they lack institutions capable of controlling the flows of capital and technology. While benefits are centralized, the consequences are distributed. Such asymmetry makes environmental crime a structural phenomenon - no longer a deviation from the system, but part of its normality.

At the core of this structure lies what can be called ecological rent: the profit gained by actors who control rare resources or the technologies for their extraction. Rent becomes an instrument of global politics: it allows states and corporations to dominate markets while evading responsibility. Peripheral countries, including many in Southeastern Europe, are transformed into zones of ecological compensation: they host waste deposits, supply raw materials, and serve as testing grounds for projects that would not be permitted in developed states. In such a system, crime becomes institutionalized through legal mechanisms such as: public tenders, concessions, and public-private partnerships.

Corporate responsibility, although legally recognized, remains limited in practice. Multinational corporations operate through complex networks of subcontractors and subsidiaries, enabling the dispersion of responsibility. When environmental damage occurs, the perpetrator is usually located at the end of the chain, while the decision-making center remains beyond the reach of local law. This diffusion of guilt represents a typical mechanism of contemporary environmental crime. Formally, everything functions according to regulations, yet the systemic outcome remains the same: nature is degraded, and accountability disappears.

In the last decade, a new form of domination has emerged: informational colonialism. States and corporations possessing satellite, analytical, and laboratory capacities have become monopolists of truth. They determine how pollution is measured, how data are interpreted, and which facts are recognized in international forums. Countries without access to these technologies depend on others' interpretations, thereby losing sovereignty over their own territory and evidence. Science, which ought to be neutral, thus becomes a tool of political supervision.

When all these patterns are connected, a picture emerges of a world in which environmental injustice has a systemic character. Responsibility can no longer be reduced to an individual act, as pollution arises from the multiplication of decisions—investment, logistical, and technological—that are, in themselves, “legal.” This undermines the traditional legal assumption of causality: the crime no longer has a clear beginning or end, only a flow. Such structural causality demands a new logic of proof, one that assesses the contribution of each actor to the total damage rather than seeking an isolated perpetrator.

Viewed from this perspective, the geopolitics of resources is not merely a matter of energy or trade, but of the global distribution of responsibility. States that control sources of information and capital shape the standards of sustainability, while others bear the burden of their implementation. In this sense, the struggle against environmental crime is not a battle against individuals, but against the structure of power that produces inequality as a natural condition.



LEGAL AND INSTITUTIONAL BARRIERS TO PROOF

Proving responsibility for environmental crime faces limitations stemming from the very nature of international law and the structure of the institutions that implement it. Existing norms were not designed for a world in which economic processes are global and harm is diffuse. Law is, by nature, territorial, whereas the causes of environmental disasters are transnational. The Rome Statute of the International Criminal Court recognizes ecocide only within the context of armed conflicts, leaving most actual environmental destruction outside its jurisdiction. In peacetime conditions, the destruction of the environment is still treated as an administrative offense rather than as a crime against humanity.

Although there are many limitations, recent years have seen signs of evolution within the international legal framework. In the last few years, there has been a noticeable shift in international legal practice indicating a gradual transformation in the approach to environmental crime. The proposal to include the crime of ecocide in the Rome Statute of the International Criminal Court (2021–2024), initiated by an independent expert panel under the *Stop Ecocide Foundation*, represents an effort to elevate environmental destruction to the level of a crime against humanity. In parallel, the European Union adopted in 2024 a new Directive on the protection of the environment through criminal law, strengthening the obligation of Member States to incorporate environmental offenses with elements of corporate liability into their national legislation. Additionally, the International Court of Justice, in rulings such as *Costa Rica v. Nicaragua*, has developed a practice of recognizing transboundary environmental damage as a breach of international law. These initiatives demonstrate that, although slowly, the global legal system is moving from an administrative toward a criminal treatment of environmental offenses, opening space for a new paradigm of international responsibility.

An additional problem lies in the fact that the main actors of environmental offenses are not individuals but collective entities—corporations, state agencies, and international consortia. Their actions cannot be reduced to the intent of a single person, nor can responsibility be precisely localized. When pollution results from decisions made by boards, management, or interconnected institutions, the legal system remains without an adequate instrument. Traditional legal concepts of causality, guilt, and intent lose their meaning. Thus, a paradox arises: the larger and more organized the offense, the harder it is to prove.

The lack of a universal definition of environmental crime leads each state to apply its own standards, while corporations exploit these differences as a space for maneuvering. In countries with weak institutions, formal compliance with regulations often conceals the actual absence of protection. Investors, insurance companies, and international financial organizations indirectly participate in the chain of responsibility, yet their role cannot be clearly defined in legal terms. As a result, environmental crime is increasingly described as a “crime without a perpetrator”, where guilt is systemic and consequences are global.

A particular challenge lies in proving the causal link between activity and harm. Environmental processes are slow, multifactorial, and often irreversible. Damage may appear years after the act, in another state's territory, and under the influence of additional factors. Courts accustomed to the logic of direct causality find it difficult to accept models based on probability and statistical correlation. Scientific evidence is often challenged due to alleged methodological relativism, while the legal system adheres to rigid formalism. Within such a framework, responsibility disappears among “multiple possible causes.”

Institutional barriers further deepen this gap. International organizations such as UNEP or UNODC have limited mandates and depend on the political will of member states. National agencies operate within budgetary and staffing constraints and are often influenced by local economic interests. This



creates a situation in which everyone is obliged to protect the environment, yet no one is able to take decisive action. The lack of coordination between scientific institutions, regulatory bodies, and the judiciary leads to evidence being lost in administrative procedures.

The solution does not lie in further multiplying regulations but in their integration. It is necessary to create mechanisms that connect scientific findings, legal standards, and institutional practice into a unified system of proof. In this regard, one can speak of a model of integrated verification, based on three principles: data transparency, mutual recognition of scientific results, and ongoing cooperation between international and national institutions. This establishes a chain of legitimacy—from scientific fact to legal decision. Evidence must be verifiable, accessible, and interpreted within a shared methodological framework, because truth that cannot be used legally loses its meaning.

Ultimately, no regulation can compensate for the lack of ethical will to enforce the law. Political interests and investor pressures continue to play a decisive role in shaping environmental policy. Even when scientific evidence is indisputable, it often remains without consequence if there is no institutional courage to apply it. Therefore, proving environmental crime is not only a legal issue but also a moral question—a matter of institutional integrity and trust in science. Only in societies where truth carries more weight than interest does evidence become the foundation of justice rather than a decoration of procedure.

THE ETHICS OF SCIENCE AND THE CONCEPT OF SUSTAINABLE JUSTICE

If science is capable of establishing truth and law is capable of formally confirming it, the remaining question concerns the ethical will of society to accept and implement that truth. In this sense, proving environmental crime is not merely a technical or legal procedure but a mirror of the moral state of civilization. Science that uncovers facts without the willingness to assume responsibility for their consequences becomes a tool of power rather than an instrument of understanding. The ethics of scientific responsibility therefore becomes a central issue: is it possible to be both objective and responsible, neutral and aware of the moral impact of one's own knowledge?

The modern scientist, particularly one engaged in environmental investigations, stands between two opposing forces. On the one hand, impartiality, measurement, and demonstrable accuracy are expected; on the other, the scientist's knowledge has political and economic consequences that go far beyond the laboratory. Every data point on pollution, every toxin analysis, and every satellite image of environmental devastation can influence capital flows, investor decisions, or international relations. In this fusion of knowledge and power, science loses the illusion of neutrality and becomes part of the system of decision-making. Within this nexus, responsibility arises — one not prescribed by law but one that defines the moral credibility of the entire scientific order.

The ethics of science, in the context of environmental crime, rests on three fundamental principles. First, transparency of knowledge: all data and methodologies must be publicly available and verifiable, because truth without accessibility becomes a privilege. Second, independence of funding: scientific institutions that depend on the same economic actors whose conduct they investigate lose their credibility. Third, public responsibility of scientists: anyone who possesses knowledge of environmental harm has a moral duty to make that knowledge visible. Silence in the name of career, project, or political convenience is equivalent to participation in concealing a crime.

In this sense, the ethics of scientific responsibility leads to a broader concept — that of sustainable justice. Sustainable justice does not only imply sanctioning offenders but also preventing future harm and



preserving the conditions of life for future generations. While traditional law looks backward, toward guilt and punishment, sustainable justice looks forward, toward consequences and responsibility. It demands that environmental decisions be made in accordance with the principle of intergenerational solidarity: what we do today must also be just toward those yet to come. Within this framework, science and law become joint guardians of the future.

Sustainable justice also requires a new kind of epistemological ethics — an awareness that truth carries a moral cost. To know is to be responsible. A scientist who possesses evidence of degradation and conceals it becomes an accomplice; an institution that knows but remains silent loses its legitimacy. In this respect, scientific evidence ceases to be neutral — it becomes a moral statement about whether society has the strength to face its own truth. Scientific ethics thus moves from the sphere of the individual to that of collective action. When truth becomes a shared value, law gains its essence, and justice becomes sustainable.

The role of the ethics of scientific responsibility, therefore, is to connect three dimensions that have thus far operated separately — knowledge, law, and value. In the union of these dimensions lies the potential for a new civilizational balance. For if science knows, law judges, and morality remains silent, the world becomes a place where truth has no effect. Sustainable justice, as a synthesis of rationality and compassion, is the only framework within which the proof of environmental crime can have meaning — not in order to punish, but to prevent repetition.

CONCLUSION

From Environmental Crime to Global Responsibility

Environmental crime represents the deepest manifestation of the imbalance between power and responsibility in the modern world. It is not merely the result of human greed but a reflection of a structural model of civilization that measures progress by the quantity of consumption rather than by the quality of life. In such a system, nature becomes a commodity and pollution a by-product of profit. While science continues to perfect its ability to measure consequences, society remains unable to transform those consequences into mechanisms of accountability. Crime against nature thus becomes the paradigm for all other forms of injustice—it exposes the logic of a world in which truth exists but lacks the strength to change reality.

Viewed in this light, the proving of environmental crime is not merely a legal act but a civilizational test of maturity. It requires the ability to connect three levels—empirical accuracy, institutional courage, and moral awareness. Science must speak clearly, law must act consistently, and politics must accept the limits imposed by truth. Without this threefold unity, all evidence remains dead data and all laws empty formalities. The true struggle against environmental crime does not begin in the courtroom but in the transformation of how we understand responsibility.

In this sense, this paper begins from the premise that sustainable justice cannot be achieved without a global ethic of responsibility. In a world of interdependent economies, no state can remain ecologically sovereign. Pollution, climate change, and resource depletion recognize no borders; therefore, neither can responsibility. What is needed is a shared legal and moral foundation—a system that recognizes truth independently of power. Such global responsibility does not mean shifting blame onto others but acknowledging that no form of progress has meaning if it destroys the conditions of life.

Sustainable justice also demands a new role for science: not merely to be a witness, but a guardian. Scientific evidence must become a driver of social awareness rather than a document for archives. Truth



holds value only if it produces action. When scientific integrity unites with legal mechanisms and ethical obligation, a space emerges in which ecological truth becomes the foundation of social trust. That trust is essential, for without it neither law nor science can function effectively.

Ultimately, environmental crime cannot be eradicated by punishment but only through a change in the value paradigm. Responsibility is no longer a legal term but a civilizational task. It implies the understanding that every act toward nature is simultaneously an act toward oneself. Proving, in this sense, becomes a metaphor for renewal—an act through which society reaffirms that it still understands the difference between truth and falsehood, between knowledge and its abuse. Only in such a world can we speak of justice that is not transient, but one that preserves the possibility of the future.

Case Study: The “Duboko” Landfill and the Social Perception of Responsibility

To observe abstract concepts of environmental responsibility within a real context, it is useful to analyze specific examples in which global patterns of irresponsibility are reflected on the local level. Such a case is the regional “Duboko” landfill near Užice — one of the most significant waste management projects in western Serbia — which for years has symbolized the conflict between the idea of sustainability and the reality of institutional incapacity. The project was conceived as a model of a modern, regionally organized system supported by international development programs, yet in practice it has proven to be an example of structural environmental vulnerability — a place where technical, institutional, and social limitations intersect.

Research conducted within the rehabilitation and reclamation program of the regional landfill revealed a pronounced gap between the formal management system and citizens’ perception of its effectiveness. Survey data indicate a high level of public concern over potential pollution of air, soil, and groundwater, accompanied by a low level of trust in local and national institutions. Only a small portion of respondents believe that waste is treated in accordance with regulations, while the majority consider that environmental problems persist and are being addressed only “on paper.” This gap between institutional discourse and public perception of risk carries deep epistemological significance: it demonstrates that in societies with low trust, neither scientific nor legal evidence possesses full legitimacy.

The “Duboko” landfill also reveals a complex network of responsibilities characteristic of environmental systems in transitional countries. Waste management is divided among multiple local governments, a regional enterprise, relevant ministries, and financial partners, resulting in fragmentation of authority. Each institution holds a portion of control, yet none bears complete responsibility. In practice, this means that problems persist in a state of “temporary technical solution,” while actual risks remain unregulated. This fragmentation essentially represents a micro-version of the global pattern of diffuse responsibility: formally, a network of regulations exists, but there is no central decision-making body capable of ensuring enforcement.

Technical analyses conducted during the investigative works identified the presence of gas emissions and indicators of potential groundwater pollution. However, these findings did not lead to a clear institutional response. Scientific evidence existed but did not evolve into a legal obligation. This discrepancy between knowledge and action confirms the central thesis of this paper — that in contemporary environmental issues, the main challenge lies not in discovering the truth, but in the willingness to respond to it. Truth without institutional will remains a document, not an instrument of change.

The role of the public in this process is particularly significant. Confronted with institutional distrust, citizens have become carriers of what can be called social forensics — collective testimony about consequences and the fear of risk. Their experiences and perceptions become part of the evidence, not in the legal but in the moral sense. When a community feels that the truth about its environment is inac-



cessible, a sense of loss of control emerges, turning into passive resignation. At that point, institutions lose their legitimacy, and the public ceases to believe in the possibility of justice. Thus, environmental responsibility becomes a question of trust — a form of trust that is harder to rebuild than the physical infrastructure itself.

The “Duboko” case illustrates, in miniature, what in the global context is a universal pattern: a system that strives for sustainability but produces unsustainability; a project that promotes transparency but operates within institutional opacity; scientific analyses that uncover problems but fail to trigger action. It shows that sustainability is not a technical but a political and moral issue. Environmental infrastructure cannot be sustainable if the social infrastructure of trust does not exist.

In conclusion, this local example confirms the general thesis of the paper: **environmental crime does not arise from the silence of scientific ignorance but from the silence of institutions that know but do not act.** “Duboko” is not merely a geographical location but a metaphor for the planet in miniature — a world in which truth, power, and responsibility are disconnected, and their reconnection becomes a condition for survival. This case study, therefore, does not offer a solution but a warning: every landfill, every invisible source of pollution, every silence over a known fact forms part of the same civilizational equation, in which the question of survival depends on the willingness to transform knowledge into responsibility.

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THE ROLE OF WOMEN IN THE INTERNATIONAL TRADE OF COCAINE – DRUG MULES

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ABSTRACT

Purpose: International trafficking in illegal drugs represents one from the most profitable and the most dangerous types of organized crime with women more and more often playing specific roles inside the criminal network. One of the most represented roles is that of the so-called *drug mules* – persons who carry drugs over state borders. Although these women are often presented as ordinary perpetrators of criminal offences or even as victims of circumstances, deeper analysis reveals a complex network of social, economic and gender factors which influence their participation in the transport of cocaine. This phenomenon is not new, but in the modern context of mass migration, social status, gender subordination, and economic insecurities it is getting a new dimension.

Coordinates and methods in which this work will be carried out: The goal of this paper is to analyse the role of women acting as '*mules*' in international trafficking in illegal drugs, with a special focus on reasons for their participation, their psychological profiles and the dilemma between their roles as perpetrators or victims of crime. The paper analyses the ways in which women participate in the transport and trade of cocaine within international criminal networks. Special attention has been given to methods of smuggling, including bodily transmission, hidden luggage and the role of a middleman in the chain of distribution. We tried to answer the following questions: Are the women in this context exclusively criminals or are they often the product of structural inequality, violence and economic necessities? What kind of role do criminal organizations have in recruitment and control of women as couriers? How much are these women really perpetrators of criminal offences and how many of them are victims of structural violence and social marginalization? Do effective programs of rehabilitation and resocialization for women convicted as '*drug mules*' exist? The methods used in the paper include: descriptive method, analysis method, historical method, comparative method, as well as a critical analysis of the penal policy towards women in the role of '*drug mules*'.

Value: It examines an under-researched aspect of organized crime – the role of women not as organizers, but as instrumentalized actors. It provides a basis for further research on women in criminal structures and their treatment in the justice system.

Result: The value of the paper indicates that women as drug carriers often operate in the gray zone between complicity and being a victim. Although, legally, these women are perpetrators of criminal offences, their involvement in the drug trade is most often not the result of free choice, but rather a product of poverty, gender inequality, domestic violence, migration status or pressure from criminal groups. In this context, it is necessary to review the approach of the justice system in order to ensure fairness, taking into account the specifics of gender, social background and personal circumstances of the women convicted as '*drug mules*'.

Keywords: women, drug trade, '*drug mules*', criminal groups, victim, violence.

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INTRODUCTION

Transnational cocaine trade represents one of the most profitable and dangerous branches of organized crime, with far-reaching consequences for security, public health, economic stability, and human rights and individual freedoms at the global level. Cocaine, as an illegal psychoactive substance, is produced almost exclusively in several Latin American countries – Colombia, Peru and Bolivia – while the key consumption markets are located in North America and Europe. Transporting drugs between production and distribution points requires a complex logistical infrastructure and support, involving so-called “mules” - persons who physically transport cocaine across international borders, most often through bodies, luggage or commercial shipments.

In recent decades, the number of women working in this capacity has increased at an alarming rate. Although female mules make up a relatively small part of the hierarchy of criminal networks, their importance in the operational chain of smuggling is undeniable. Their involvement is often the result of a combination of structural factors – poverty, unemployment, gender inequality, domestic violence, lack of education and gender-based exploitation. In many cases, women are not only economically forced to participate in criminal activities, but are also directly manipulated, blackmailed or emotionally bound by individuals from criminal structures.

Despite the complexity of their position, justice systems around the world often approach women mules through a strictly repressive and individualizing perspective, ignoring the contextual factors that led to their criminalization. Such approach leads to multiple victimizations: women are not treated as persons in a vulnerable position, but as equal criminal actors, which is why they are subject to long prison sentences, social stigmatization and marginalization after leaving the system.

The transfer of cocaine across international borders is a key stage in the global drug trafficking chain. This activity requires sophisticated logistics and the involvement of various participants, from individual couriers to complex networks that organize transport. To reduce the risk of detection, criminal groups use various methods, such as hidden compartments in luggage, in vehicles or even inserting drugs into the human body. It is precisely in this segment that organised crime shows its strength - coordinated flows of money, people and drugs connect several continents and enable a stable market supply. National borders become high-risk points where conflict is waged between repressive authorities and criminal structures. Despite the constant improvement of control mechanisms, smuggling networks are finding new ways to circumvent surveillance, confirming their adaptability and internationality.

THE TERM ‘MULE’ AND THE TRANSNATIONAL TRADE OF COCAINE

In modern security and criminological studies, the term ‘mule’ refers to a natural person, most often an individual who transports cocaine across international borders through the body (e.g. by swallowing drug packages), hidden in clothing, luggage, a vehicle or commercial goods. Mules represent low-profile operatives within complex criminal networks that organize the distribution of narcotics



around the world (Fleetwood, 2014: 22). In the context of the cocaine trade, geographic flows most often start from the Andean countries of Latin America (Colombia, Peru, Bolivia), pass through Central America and the Caribbean, and end up in high consumption markets - in the United States of America and Europe (United Nations Office on Drugs and Crime, UNODC, *Global Report on Cocaine*, 2023: 28). Mules facilitate the transition of drugs through the so-called “soft spots” - airports, ports and border crossings with a lower level of control.

Due to the need for discretion and to reduce the risk of detection, criminal networks are increasingly hiring women as mules. Women are perceived as “less suspect” due to their physical features, social stereotypes and family roles (e.g. mothers with children), which make them ideal candidates for this form of exploitation (Sudbury, 2005: 88). Stereotypes about women who serve as ‘mules’ in drug trafficking often depict them in a simplistic way. They are most often imagined as poor and gullible, women who are easily abused by criminal groups because of their vulnerable position or family obligations. Also, there is a common opinion that women attract less attention than men, so it is considered that they pass through controls more easily. However, such views ignore the fact that behind such situations there is a much more complex background - from coercion and manipulation to a personal decision conditioned by material problems. Precisely because of this, stereotypes not only simplify reality, but also contribute to stigmatization, instead of understanding the real causes and circumstances that lead women to such risks.

WHY WOMEN BECOME MULES AND THEIR ROLE IN TRANSNATIONAL TRADE

The phenomenon of the engagement of women as mules requires consideration from the perspective of gender inequality, social vulnerability and economic exclusion. Women who participate in the transnational cocaine trade often come from poor, migratory unstable environments, without access to education, employment or institutional protection. In this context, their participation in criminal activities does not necessarily arise from criminal intent, but from existential necessity (Dorn, Levi, & King, 2005: 56–58). Women are recruited because of gender-based stereotypes: seen as “harmless”, “invisible” and “emotionally vulnerable”, they are ideal mules which in most cases manage to pass border controls without detection (Maher & Daly, 1996: 470). In practice, however, they become the first profile to be processed when a smuggling attempt is detected.

In addition, a significant number of women are recruited in the context of intimate partner relationships. Many mules are emotionally attached to men in higher positions in criminal structures, and their loyalty, fear, or dependence lead to putting themselves in extremely risky situations. There are numerous examples in which women smuggled cocaine not for personal gain, but because of blackmail, threats or emotional manipulation (Campbell, 2018: 260). In the operational structure of criminal networks involved in the cocaine trade, mules - and women among them - occupy the riskiest and weakest positioned roles. Although they are functionally important because they carry out the physical transfer of cocaine, from the point of view of the network they are easily replaceable and completely expendable. Their loss, either by arrest or death (due to bursting of capsules), does not lead to major disruptions in criminal structures, precisely because of their availability and marginal status (Fleetwood, 2011: 375–393). The organizers of smuggling operations are rarely identified or prosecuted, while female mules, as the most visible actors at borders and airports, become the primary targets of criminal prosecution. According to UNODC statistics, in some Latin American countries, more than 60% of women in prisons were convicted of drug-related crimes, while most of them had the role of mules (UNODC, *Women and Drugs: Drug policy and incarceration*, 2018:17). The aforementioned



facts confirm the asymmetric character of justice, where the penal system targets the weakest actors, while the real power structures remain intact. Female mules are therefore at the centre of a paradox - they are both instruments of the cocaine trade system and objects of the state's repressive response.

METHODS OF TRANSPORTING COCAINE BY WOMEN MULES

Organized crime, especially related to the crimes of drug abuse, illegal arms and human trafficking, is on the rise. The number of the most serious crimes committed is growing, and the difficulties in discovering and proving the commission of those crimes and the perpetrators are very great due to the increasingly sophisticated organization of criminal associations (Vulević, 2023: 200). Female mules use different modalities to transport cocaine, which criminal networks adapt to the degree of control at borders and transport routes. The most common form of transport is the transfer of cocaine inside the body, known as *body packing*, where the cocaine is introduced into the gastrointestinal tract in the form of multiple wrapped packages made of latex, condoms or balloons. These packages contain from 3 to 10 grams of substance, while the total weight can exceed one kilogram (Beckley, Ansari, Khwaja & Mohsen, 2009: 164). In addition to ingestion, cases of rectal or vaginal insertion of packages have also been reported, which increases the risk of medical complications and reduced detection on scanners (Schaper, Hofmann, Ebbecke, Desel & Langer, 2003:630). The second modality includes physical hiding in the wardrobe or luggage — in bras, shoes, the double bottom of a suitcase or specially made partitions (Europol, *Drug trafficking in the European Union*, Luxembourg, Publications Office of the European Union, 2017). Transportation through false pregnancies, where women hide packages in artificial stomachs or attached to the body in order to arouse sympathy and reduce the likelihood of control, has been especially documented (United Nations Office on Drugs and Crime - UNODC, *World Drug Report 2019*, Vienna, UNODC, 92-94). Cases have been recorded at the airports in South America and Europe where women used as mules wear specially made wigs or hair extensions in which packages are sewn, as well as hidden in cosmetic and hygienic products (shampoos, creams, pads) filled with cocaine powder or its liquid form (International Narcotics Control Board – INCB, *Annual Report*, Vienna, United Nations, 2020: 68). All these forms of smuggling illustrate high degree of innovativeness of the criminal network, but at the same time, they point to the instrumentalization of the body and the everyday subjugation of women mules as a means of transporting cocaine.

COCAINE TRANSPORTATION INSIDE OR OUTSIDE THE BODY (BODY PACKING)

One of the most specific and riskiest ways of smuggling narcotics is the method known as *body packing*, which implies carrying packages of cocaine in the human gastrointestinal tract. This practice is particularly frequent among the so-called 'mules', a significant percentage of whom are women, because of their vulnerabilities and susceptibility to manipulative pressure by organized criminal network. Average number of package ranges from 50 to 100 pcs, and the total quantity of cocaine which one individual can transfer may exceed one kilogram (Schaper et al., 2003: 631). Packages are usually made from latex, condoms or balloons in multiple layers. They are wrapped in order to reduce the risk from rupture. Despite this, medical literature notes a large number of cases of fatal intoxication due to packet rupture, which is why there is a massive absorption of cocaine and fast mortal outcomes (Pramanik & Vidua, 2016:2). Most often complications include acute intoxication, perforation of intestines, ileus and cardiotoxic effects, while emergency surgical interventions are necessary in situations when conventional treatments are not enough (Beckley, Ansari, Khwaja & Mohsen, 2009:166). In view



of the high mortality rate and the serious health consequences, body packing is considered one of the most dangerous methods in cross-border drug trafficking, which also confirms the instrumentalization of drug couriers as “expendable” labour in global criminal networks.

Body packing, represents one of the most dangerous and the cruellest methods of smuggling, to which women are often exposed. In this type of smuggling, capsules of cocaine, usually coated in latex or plastic, are ‘packed’ into the body by swallowing or by rectal and vaginal insertion (Traub, Kohn, Hoffman & Nelson, 2003: 2522). The number of capsules varies, but in practice there are records of cases in which women carried over 100 capsules, with the total weight larger than one kilogram (Bulstrode, Banks & Shrotria, 2002: 35–38). This one-way transport implies exceptionally high health risk because even the smallest capsule damage can lead to a fatal outcome, poisoning and death within a few minutes. That is why *body packing* is indicated in the literature as a combination of criminal exploitation and extreme inhumanity to women’s bodies (Deitel & Syed, 1973: 211). Organized criminal groups force women into this practice, often using psychological and physical coercion, as well as promises of quick profits or loan pay off. Numerous cases of discovery of mules through X-rays and scanners have been recorded at airports throughout Europe and Latin America, leading to an increase in the number of arrests of women forced into this type of smuggling (Deitel & Syed, 1973: 212). At the same time, there are also cases where women accept this risk due to ignorance or pressure, without awareness of the mortal dangers and consequences that the *body packing* can cause. This phenomenon shows the complexity of gender perspectives in the transnational trade of narcotics because women in these cases are not only executors of criminal offenses, but also victims of brutal instrumentalization of their own bodies.

WOMAN MULE AS VICTIM AND PERPETRATOR: FEMINIST-CRIMINOLOGY APPROACH

Feminist criminology indicates that the traditional approach to criminality is gender-blind and insensitive to the specific social and economic conditions that induce women to become involved in criminal activities. A fundamental question posed by criminological debates: do women enter the cocaine trade because they are passive and helpless victims or bait, or do they make decisions of their own free will? (Fleetwood, 2014: 180). In the mentioned framework, the woman mule cannot be seen only as a bearer of criminal responsibility, but also as a subject of multiple victimization - economic, institutional, partner and legal (Campbell, 2008, 240). In the context of the transnational cocaine trade, feminist theories emphasize that many women are actually victims of patriarchal relations within criminal networks, as well as the wider social structure in which they live. Their actions as mules are often the result of a lack of autonomy, psychological pressure and dependence on male authority – be it partners, family members or local gang leaders (Crenshaw, 1991: 1250). Criminal justice systems must develop models that recognize the difference between high-ranking organizers and women who are vulnerable to manipulation or coercion, in order to facilitate fairer sentencing and provide opportunities for rehabilitation.

Criminological profile and patterns of vulnerability of women mules

The profiles of women mules most often includes persons who come from economically and socially marginalized backgrounds, with limited opportunities for legal employment and social mobility (Fleetwood, 2014: 46). The majority of them are encouraged by poor community of Latin America, Africa or eastern Europe, where organized criminal groups simply find vulnerable targets (UNODC,



The role of women in drug trafficking, United Nations Office on Drugs and Crime, 2012, 7–12). Typically, these are women between the ages of 20 and 40, although there are also cases of older women who were recruited due to economic dependence or family obligations (Campbell, 2008: 235). Many of them are single mothers or members of multiple discriminated social groups, which additionally makes them suitable targets for manipulation (Maher & Hudson, 2007: 548). The psychological profile often includes low self-esteem, a high degree of dependence on others, and a strong pressure to provide main sources of income for the family (Fleetwood, 2017: 532). In a large number of cases, female mules had minimal or no contact with the justice system prior to criminal activity, which indicates their instrumentalization by the organizers of the criminal group (Schloenhardt, 2019: 124). They are often faced with promises of quick and easy earnings, but also with threats or coercion, which is why they are consciously or unconsciously drawn into the network of drug trafficking (UNODC, *Handbook on Women and Imprisonment*, 2nd edition, 2019, 38–41). Unlike high-ranking perpetrators, women mules rarely have knowledge of the entire structure of a criminal organization, but instead play the role of one-time high-risk perpetrators (European Monitoring Center for Drugs and Drug Addiction (EMCDDA), *Drug trafficking and women: a European perspective*, 2020, 14–16). This profile indicates their vulnerability and the need for criminal policy to distinguish between them and the organizers, through the introduction of alternative sanctions, protective measures and reintegration programs (Baratta & Frosini, 2020: 190).

Numerous studies indicate the fact that the women engaged as “mules” have often previously been victims of sexual exploitation and human trafficking. Criminal networks are recruiting women from marginalized communities, using combination of deception, coercion and violence, which is why they are first introduced into chains of sexual exploitation, and then instrumentalized for drug trafficking (UNODC, *Global Report on Trafficking in Persons*, New York, United Nations, 2018, 34–39). In many cases, women from Africa and Latin America are brought to Europe under false pretences, lured by promises of employment or better life, only to end up in double exploitation – as forced sexual objects and as couriers for transporting cocaine (International Organization for Migration, IOM, *Caring for Trafficked Persons: Guidance for Health Providers*, Geneva, IOM, 2016, 47–52). This practice additionally complicates their legal position, because they appear simultaneously as perpetrators of criminal offenses and as victims of organized crime and human trafficking. This raises the question of the necessity of implementing gender-sensitive and victimologically oriented approaches in criminal proceedings, in accordance with international standards for the protection of victims and witnesses (Gallagher, 2010: 214–220).

Examples of women mules from Latin America and Europe

In Colombia and Peru, the number of women in prisons due to cocaine trade is continuously growing. A study of organization *Dejustice* from 2019 shows that as many as 75% of prisoners in Colombia are women convicted for their role in drug trafficking, that most of the mules are without a previous criminal record and with an addiction to partner violence? (Dejusticia, *Mujeres, delitos de drogas y políticas de encarcelamiento en Colombia*, Bogotá, Centro de Estudios de Derecho, Justicia y Sociedad, 2019, 12–18) In Spain and Italy, a large number of foreign nationals in prison are women who were found with cocaine at the airport. In most cases, they come from Nigeria, Brazil and Dominican Republic (European Monitoring Center for Drugs and Drug Addiction – EMCDDA, *Women in the criminal justice system and drug offenses in Europe*, Luxembourg, Publications Office of the EU, 2019, 33–36). Their engagement is often related to organized commercial and sexual exploitations, which complicates their legal position and additionally makes access to justice difficult.



The European Court of Human Rights (ECtHR) has warned in several cases about the states' obligation to assess the individual circumstances of women who are in prisons for cocaine trafficking, especially if they were previously victims of human trafficking or cocaine trafficking (European Court Human Rights (ECHR), case *Rantsev Against Cyprus and of Russia*, judgment of January 7, 2010, Case *LE against of Greece*, judgment of January 21, 2016).

Case from Italy: Palermo - Punta Cana, 2017, a twenty-five-year old Italian woman from Palermo was arrested at the airport in the Dominican Republic while trying to board the flight to Milan with almost 800 grams of cocaine sewn inside her clothes. She had no previous criminal record. She worked as a waitress at a seasonal bar and said she was recruited by her childhood friend, who had promised to help her "get" the family out of debt. The court in Milan, where she was extradited, sentenced her to four years in prison, but after two years she was transferred to house arrest due to her good cooperation with the judicial authorities. (Case study: Palermo–Punta Cana route, 2017, Court of Milan proceedings).

Case from Spain: On a flight from Peru to Madrid, 2016, Spanish customs authorities arrested a 32-year-old Peruvian woman at the Barajas airport who brought in 1.6 kg of cocaine in the form of a capsule that she swallowed. During the trip, she became ill, which led to the intervention of an emergency physician and the discovery of drugs. It turned out that she was part of a larger cocaine network that used poor women from Lima to transport the capsules to Europe. The woman was recruited through a relative, and she was supposed to receive 2,000 euros for the transfer. She was sentenced to five years and three months in prison, but the court concluded that she was a "victim of social exploitation", which was treated as a mitigating circumstance (Case study: Barajas Airport, Madrid, 2016, Spanish Customs and Criminal Court).

Case from Colombia: According to the National Institute of Prisons in Colombia (INPEC), more than 45% of women in prisons are serving sentences for cocaine trafficking, mostly as mules. Most of them are from poor groups and without education. These women often do not know the details of the final destination of the cocaine or the organization they belong to. Criminal groups use them knowingly because punishments for women are often lighter and women arouse less suspicion during checks (Instituto Nacional Penitenciario y Carcelario, *Statistical Report on Women Convicted of Drug Trafficking*, Bogotá, INPEC, 2020).

LEGAL TREATMENT AND CRIMINAL CONSEQUENCES FOR WOMEN MULES

The criminal justice systems of various countries criminalise possession and distribution of cocaine largely irrespective of the circumstances, ignoring a contextual analysis of the motivations and role of women mules. In most jurisdictions, women transporting cocaine are subject to the same or even harsher penalties than men, with mitigating circumstances relating to coercion, manipulation or economic vulnerability rarely invoked. National legislations generally rely on repressive models of cocaine control, based on international conventions (e.g. the Convention on Narcotic Drugs of 1961, the UN Convention of 1988). In that framework, the focus is on the prohibition of possession and transfer, without differentiation according to the degree of responsibility or coercion of participation (United Nations, *Single Convention on Narcotic Drugs*, 1961).² However, certain countries and organizations advocate a humane and gender-sensitive approach. So, for example, in Brazil and Colombia, a number of programs have been launched that enable the reduction of sentences for women who have been convicted for the first time, who are parents of young children or who have been forced to par-

2 https://www.unodc.org/pdf/convention_1961_en.pdf



ticipate in criminal activities (Penal Reform International, *Women in the criminal justice system and the impact of drug policies*, 2017).

WOMEN MULES AS ENDANGERED WITNESSES IN THE PROTECTION PROGRAM

There are cases in which women mules who have decided to cooperate with judicial authorities — either as protected witnesses in criminal proceedings or as witnesses in trials against members of criminal networks — are included in Witness Protection Programs. Witness protection has become increasingly important in recent years, as justice-breakers have become increasingly sophisticated in their methods of retribution (Vulević, 2023: 191). This situation is particularly common in countries with a pronounced problem of transnational cocaine trafficking, such as Colombia, Brazil, Italy and Spain (UNODC, *Handbook on the management of witness protection programs*, 2019). Female mules often possess key information about the structure of criminal groups, the logistics of smuggling, the identities of the organizers or methods of recruitment. Given the nature of criminal networks, their statements can threaten their safety and lives, which is why protection is necessary. Some cases include threats from members of the network or family circles who exert pressure or try to prevent them from cooperating with the state (European Union Agency for Fundamental Rights, *Protection of vulnerable witnesses in criminal proceedings*, 2014). Many women mules come from very vulnerable backgrounds, with weak legal literacy and trust in institutions, which makes it difficult for them to cooperate and be included in protection programs. Sometimes, due to social stigma and personal trauma, these women find it difficult to adapt to new living conditions within the Protection Program (International Association of Witness Protection Professionals (IAWPP) - case studies).

In Italy, in some cases, women mules who agreed to cooperate with the prosecution against Mafia clans entered Protection Programs with changed identities and special security measures. It is similar in Colombia, where women mules are often key witnesses in actions against drug cartels, while providing protection through state programs and international projects (Baratta & Frosini, 2020: 150). Specifically, as a result of intimidation, threats, coercion, various pressures on a witness who is not protected, there is a fear of testifying, the possibility of giving up the testimony, and even the possibility of giving a false testimony (Vulević c, 2023: 170).

INTERNATIONAL COOPERATION IN SUPPRESSING TRANSNATIONAL TRAFFIC IN COCAINE

International cooperation has a crucial role in the fight against transnational drug trafficking, since smuggling chains include countries of origin (Latin America), transit (West Africa, Balkans) and destination (Europe, North America). Women mules, in this context, appear as immediate perpetrators who enable the identification of broader criminal structures and are a key source of intelligence and procedural information.

The legal framework of cooperation is based on the following international documents:

1. United Nations Convention against Transnational Organized Crime - Palermo Convention (2000), which prescribes the obligation of states to develop joint investigations, facilitate extra-



dition and provide mutual legal assistance (UN Convention against Transnational Organized Crime, Palermo Convention, United Nations, 2000).³

2. The UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances (Vienna, 1988), which emphasizes the criminalization of production, possession and distribution of narcotics, as well as the obligation of international cooperation in law enforcement (UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, United Nations, 1988).⁴
3. Regional instruments, such as the legal framework of the European Union and the activities of bodies such as Europol, Eurojust and Joint Investigation Teams (JITs), which enable parallel investigations in several countries.

Mutual recognition of court decisions and accelerated extradition procedures are particularly important, as drug cartel organisers often use the differences between legal systems to evade criminal responsibility. In this context, women mules who decide to cooperate with law enforcement authorities often participate in witness protection programmes and sometimes also in international programmes that allow them to be resettled in third countries and receive security there. In this way, international cooperation simultaneously increases the capacity of states to take repressive action against criminal organisations and strengthens mechanisms to protect the human rights of women mules, creating a balance between security priorities and a humane approach to criminal policy.

MEASURES FOR THE PREVENTION AND TREATMENT OF WOMEN MULES IN THE TRANSNATIONAL TRAFFIC OF COCAINE

The phenomenon of the involvement of women as mules in the transnational cocaine trade requires a complex approach that combines legal, social and security measures, with a clear understanding of gender specificities and vulnerabilities. Some of the necessary measures to be implemented are as follows:

1. **Gender-sensitive criminal policy** - Criminal justice systems should apply an approach that recognizes the complexity of the situation of women mules, especially those who have been exposed to coercion, manipulation or difficult socioeconomic conditions. Introducing relief in penal policy for women who are not key organizers of trafficking, but instrumentalized perpetrators, is the basis for a fairer system (United Nations Office on Drugs and Crime, UNODC, *Toolkit on Gender-Responsive Non-Custodial Measures*, 2020).
2. **Reintegration programs and alternative sanctions** - Prison sentences should be the last measure, while for women mules it is preferable to introduce alternative sanctions, such as community work, counselling programs, psychosocial support and educational activities. This approach has a positive effect on reducing recidivism and allows women to reintegrate into society with new knowledge and skills (Penal Reform International, *Global Prison Trends: Women in Prison*, 2017).
3. **Education and prevention in vulnerable communities** - Prevention should target poor and marginalized women through educational campaigns that highlight the risks of participating in cocaine smuggling and offer alternative sources of income. Inclusion of local leaders and non-governmental organizations contributions strengthen the resistance of the community (Human Rights Watch, *"No Way Out": Human Rights Abuses in the War on Drugs*, 2018).
4. **International cooperation and training police** - Specialized training for members of police and judiciary enables recognition of cases of human trafficking and coercion against women. Im-

³ <https://www.unodc.org/unodc/en/organized-crime/intro/UNTOC.html>

⁴ https://www.unodc.org/pdf/convention_1988_en.pdf



proved cooperation between countries of origin, transit and destination is key to effective fight against organized network, simultaneously protecting the rights of endangered women (United Nations Office on Drugs and Crime, UNODC, *Handbook on Gender and Drug Policy*, 2019).

5. **Concise distinction between organizer and mule** - The justice system must clearly distinguish between perpetrators of crimes and women who act under coercion or manipulation, which will prevent disproportionate punishment of the most vulnerable and enables targeted suppression of criminal rings. Certainly, national legislations need to find acceptable harmonization solutions for possible conflict interest between individual rights and legal interest of the society (Vulević b, 2023: 170).

RECOMMENDATIONS FOR A REFORM OF CRIMINAL POLITICS IN CONNECTION WITH WOMEN MULES IN TRANSNATIONAL COCAINE TRADE

On the basis of previously implemented analyses and identified challenges in processing and treatment of women mules in the criminal justice system, we can single out the following key recommendations:

1. **Differentiated criminal processing** - It is necessary to establish a clear normative and procedural difference between high-ranking members of the organized criminal structure and low-ranking perpetrators who act under coercion, deception, abuse of a vulnerable position or in conditions of economic and social marginalization. In this sense, it is recommended to change the provisions of material and procedural criminal rights so as to allow a more flexible approach to the qualifications of the offense, the imposition of sanctions and the eventual application of the institute of the possibility of criminal prosecution for those actors whose guilt is significantly reduced by the circumstances under which they acted (Schloenhardt, 2019: 210–214).
2. **Gender sensitive criminal law frame** - It is necessary to introduce special mitigating circumstances and protection mechanisms for women who have committed criminal acts for the first time and who were previously exposed to manipulation, coercion, violence or other forms of abuse. This includes the inclusion of the principle of gender equality in legal norms, as well as the harmonization of domestic legislation with international documents, such as UN *Convention Against Transnational Organized Crime* and *Convention on the Elimination of All Forms of Discrimination against Women* (CEDAW) (Fleetwood, 2017: 528).
3. **Alternative sanctions and programs of social reintegration** - Instead of the routine application of prison sentences, it is necessary to develop a system of alternative criminal sanctions (suspended sentence, conviction, community service, house arrest with supervision) and ensure access to rehabilitation and reintegration programs. Such programs should include educational and vocational courses, health and psychological support, addiction recovery programs, and social inclusion measures that reduce the risk of relapse (UNODC, *Handbook on Women and Imprisonment*, 2nd edition, 2019, 68–72).
4. **Specialized training for judicial and police authorities** - The prosecution, courts and police services should conduct continuous education on gender-based aspects of organized crime, psychological and social determinants of criminal behaviour and apply international human rights standards. Training should include topics related to recognizing indicators of coercion and human trafficking, to ensure a differentiated and fair response and justice (European Union Agency for Fundamental Rights, *Protection of vulnerable witnesses in criminal proceedings*, 2014, 34–37).
5. **Improved international judicial and police cooperation** - It is necessary to intensify the exchange of operational, intelligence and forensic information between countries of origin, transit



and destination of cocaine. The focus of international cooperation at sea should be on identifying, locating and prosecuting the organizers and financiers of smuggling operations, and not exclusively on apprehending and convicting couriers. Expanding bilateral and multilateral extradition agreements, legal assistance and joint investigation teams are also recommended (Joint Investigation Teams - JIT) (UNODC, *United Nations Convention against Transnational Organized Crime and the Protocols Thereto (Palermo Convention)*, 2004, 23-25).

CONCLUSION

The phenomenon of the female mule in the transnational cocaine trade represents a complex criminological, legal and socio-economic problem that goes beyond the boundaries of individual countries and requires a coordinated international response. The analysis shows that women mules most of the time do not occupy central positions in criminal hierarchies, but rather work as the most vulnerable segment of the criminal network, exposed to the largest operational risks and the strictest criminal sanctions. Their involvement in smuggling activities is often a consequence of economic deprivation, gender conditional violence, manipulation or abuse of a vulnerable position. The phenomenon of the female mule in the transnational cocaine trade represents a complex criminological, legal and socio-economic problem that goes beyond the boundaries of individual countries and requires a coordinated international response. This approach can lead to disproportionate punishment of women mules and missed opportunities to prosecute key actors in organized crime. Considering the above, it is necessary to develop gender-sensitive criminal prosecution mechanisms that will take into account the specific circumstances and minimize the guilt of these criminal perpetrators. Implementation of alternative sanctions and social reintegration programs can contribute to the reduction of recidivism and provide the possibility of exiting criminal structures. In addition, specialized training of prosecutors, judges and police officers on the gender aspects of organized crime and indicators of coercion can improve the quality of investigations and criminal proceedings. International cooperation remains a key element in the effective suppression of transnational cocaine trafficking, particularly in terms of information sharing and joint operations aimed at breaking up criminal networks. The experience of countries that have developed comprehensive witness protection programmes shows that female mules, as potentially valuable cooperating witnesses, can be an important source of evidence against the organisers of cross-border smuggling operations. An effective policy to combat this phenomenon must be based on a combination of repressive and preventive measures, with a focus on human rights and gender equality. Ignoring the gender dimensions of this problem can perpetuate injustice and weaken the overall results of the fight against organised crime. Only a comprehensive, integrated and gender-sensitive approach can bring about sustainable results in reducing the role of female mules in cross-border cocaine trafficking.

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IV

NATURAL AND APPLIED SCIENCES IN FORENSICS, CYBERCRIME AND SECURITY



IMPROVEMENT OF NEURAL NETWORK MODEL FOR PPG SIGNAL ANALYSIS

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ABSTRACT

Purpose: This paper proposes to improve the method of predicting the age of the subject based on the recorded PPG signal.

Design/Methods/Approach: The PPG signal was obtained by the photoplethysmography method. The prediction method is based on the concept of a neural network, which uses wavelet transformation coefficients of the recorded PPG signal for training. The paper uses an RNN (Recurrent Neural Network) network, which was designed on five different architecture models. The focus of the work is on the comparison of the test results of these five different models and the selection of the model with the most acceptable results for further work. These five RNN models differ in the number of hidden layers. The first model has one hidden layer, the second has two hidden layers, etc., and the fifth model has five hidden layers. A database with 500 recorded PPG signals is used to train the network.

Findings: The results of this paper open the discussion of whether a larger number of hidden layers affects the prediction results and to what extent. There is also a discussion about whether to use RNN architecture or perhaps CNN (Convolutional Neural Network), which is again the topic of some future work in which a comparison of the results of these two architectures should be made.

Originality/Value: The use of wavelet transformation in the analysis of PPG signals can determine in a compromise way when certain changes occur in the signal and what their frequency content is. The goal of this work is in the domain of development, testing, and addition of software solutions in the analysis of PPG signals, application of these solutions in artificial NN modeling and analysis of prediction results obtained by this method.

Keywords: photoplethysmography (PPG), wavelet transformation, neural networks, machine learning, characteristic parameters.

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PURPOSE

This paper will attempt to improve the concept of a neural network, which is used for data prediction based on the recorded PPG signal.

The subject of analysis are signals, i.e., biomedical signals obtained by the method of photoplethysmography – PPG signals (Hertzman, A., 1938).

Biomedical signals, or biosignals, are spatial, temporal, or spatio-temporal records of a biological phenomenon. Biosignals contain information that is of great importance for understanding the specific physiological mechanisms of biological phenomena or the systems from which they originate.

Signals provide important information about the internal state of organs, response to external stimuli, general condition, general health, and the state of various other parameters and are an indispensable part of modern medical diagnostic practice (Allen, J., & Kyriacou, P., 2021).

A photoelectric transducer placed on the skin measures the volume pulse in the peripheral parts of blood vessels (Avolio A., 2002). Corresponding volume pulsations modulate the exposed light beam of incoming infrared light, resulting in changes in intensity. They are measured with a phototransistor/photocell/photoresistor.

Further processing of the intensity changes in the gain stage leads to a visible image of the pulse curve (Allen, J., 2007: 28(3)) (Webster, J. G., 2010) (Allen, J., & Kyriacou, P., 2021). PPG is an easy-to-set-up, efficient device compared to other types of plethysmography (Campolo, 2010).

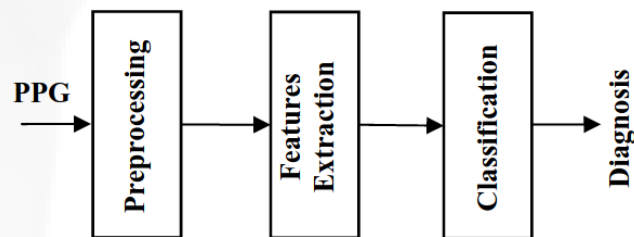


Figure 1: Processing of PPG signals

DESIGN/METHODS/APPROACH

PPG signals obtained by the photoplethysmography method are recorded in the database (URL8). The display of the signal obtained by the photoplethysmography method, which was recorded in the database, is shown in Figure 2.

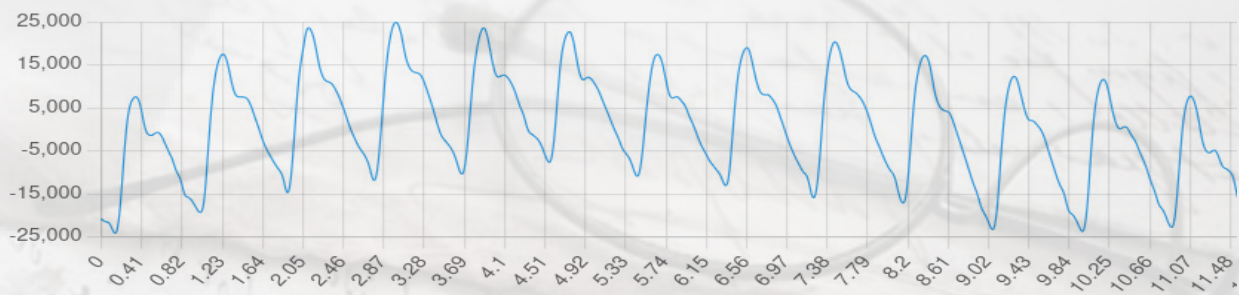


Figure 2: Display of the signal obtained by the photoplethysmography method



The signals placed in the database are further analyzed using the wavelet transformation method, and a connection is assumed between the coefficients obtained by the transformation and the parameters important for the diagnosis of the so-called characteristic parameters of the PPG signal (Figure 1) (Radovanović et al., 2025).

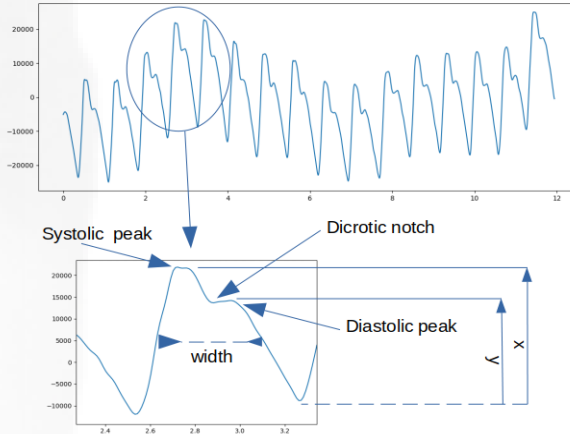


Figure 3: Characteristic parameters of the PPG signal - systolic, diastolic peak and pulse width

Characteristic parameters that define and describe the PPG signal and that influenced the choice of wavelet used for transformation (Figure 3) (Radovanović et al., 2025):

Augmentation index – Pressure increase AI is a measure of the impact of the return wave on the systolic arterial pressure, it is obtained by measuring the reflected wave that goes from the periphery to the center.

Pressure increase is obtained using the formula

$$AI = y/x \quad (1)$$

where y is the height of the diastolic and x is the height of the systolic peak during one pulse (Figure 3) (Takazawa, K. et al., 1998).

An alternative formula is also sometimes used in the literature

$$AI = (x-y)/x \quad (2)$$

(Rubins, U. et al., 2008).

The PPG signals (Figure 5) used in this work for training the network are transformed signals using the wavelet transformation method, which was performed using the wavelet rbio3.3 (Figure 4), which was selected as the most optimal for estimating the characteristic parameter AI (Augmentation index) (Radovanović et al., 2025).

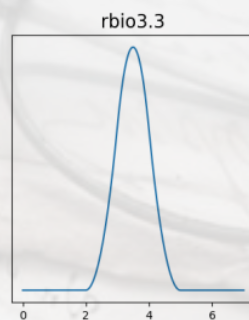


Figure 4: Wavelet rbio3.3

Wavelet transformation is often used for the purposes of representing complex signals and extracting their important characteristics (Radunović, D. P., 2005; Mallat, S., 1998; Stark, H. G., 2005) (URL1).

This transformation is an important link in the development of various techniques that can be significant for specific applications, such as clinical practice in medicine (Radovanović et al., 2025).

This procedure requires the execution of several scripts written in the Python programming environment. The scripts will be roughly described in the following text, and the special focus will be on the attempt to improve the neural network that would make predictions based on the analyzed PPG signal, which is also the topic of this work.

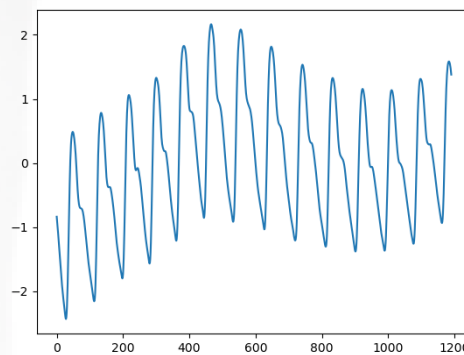


Figure 5: Typical PPG signal

Brief description of the procedure for generating the database used for training the neural network (Radovanović et al., 2025):

The recorded PPG signals are located in the database db.xlsx (Figure 2) (URL8).

A script named “excel_to_struct.py” is used to organize the database in which the recorded PPG signals are stored so that they are suitable for further processing, and the result of running this code is a database named “moderated_excel.csv” (Figure 6). Figure 7 shows the drawing of 10 random signals from the “moderated_excel.csv” database.

	A	B	C	D	E	F	G	H	I	J
1	id	age	data							
2	2013338	0.3	[-2075, -1009, 28, 1037, 1990, 2858, 3603, 4160, 4528, 4707, 4745, 4650, 4471, 4245, 400							
3	2013323	0.34	[-11627, -11584, -11670, -12006, -12696, -13626, -14522, -15108, -15323, -15384, -15539, .							
4	2018532	0.35	[18174, 17403, 16653, 15922, 15212, 14543, 13914, 13336, 12809, 12312, 11835, 11369, .							
5	2018531	0.57	[-13403, -11313, -9301, -7451, -5849, -4402, -2937, -1284, 539, 2235, 3502, 4119, 4188, 38							
6	2018521	0.49	[-18072, -19190, -20238, -21126, -21795, -22065, -21566, -19909, -16744, -12222, -7072, -2							
7	2018515	0.65	[-3533, -4546, -5471, -6206, -6683, -6912, -6961, -6902, -6792, -6653, -6514, -6395, -6335,							
8	2018524	0.58	[-16051, -16536, -17030, -17525, -18051, -18587, -19144, -19721, -20298, -20835, -21288, .							
9	2018532	0.35	[18174, 17403, 16653, 15922, 15212, 14543, 13914, 13336, 12809, 12312, 11835, 11369, .							
10	2018514	0.65	[-396, -1145, -1885, -2625, -3365, -4068, -4727, -5304, -5801, -6252, -6685, -7145, -7650, -							
11	2018522	0.49	[-8398, -8751, -9104, -9466, -9838, -10209, -10609, -11027, -11473, -11956, -12476, -13043,							
12	2018511	0.46	[16104, 15677, 15260, 14865, 14502, 14181, 13925, 13754, 13648, 13583, 13530, 13466, .							
13	2018490	0.31	[-25000, -23521, -21599, -18827, -14824, -9936, -4976, -717, 2391, 4427, 5499, 5729, 5313,							
14	2018489	0.59	[-15756, -16114, -16442, -16681, -16810, -16870, -16950, -17129, -17437, -17786, -18064, .							
15	2018488	0.49	[9998, 9615, 9161, 8555, 7736, 6659, 5386, 3988, 2510, 1041, -356, -1584, -2590, -3374, -							
16	2018487	0.4	[-11070, -9440, -7910, -6580, -5520, -4760, -4250, -3980, -3900, -3960, -4110, -4310, -4520,							
17	2018485	0.57	[-8132, -8581, -9040, -9490, -9949, -10417, -10886, -11354, -11833, -12320, -12817, -13324,							
18	2018482	0.54	[7120, 6449, 5789, 5166, 4601, 4103, 3643, 3203, 2791, 2379, 1987, 1584, 1192, 828, 483,							
19	2018478	0.3	[3244, 3092, 2940, 2747, 2523, 2300, 2117, 2026, 2016, 1955, 1731, 1264, 655, 66, -370, .							

Figure 6: Signals suitable for further processing are located in the database “moderated_excel.csv”

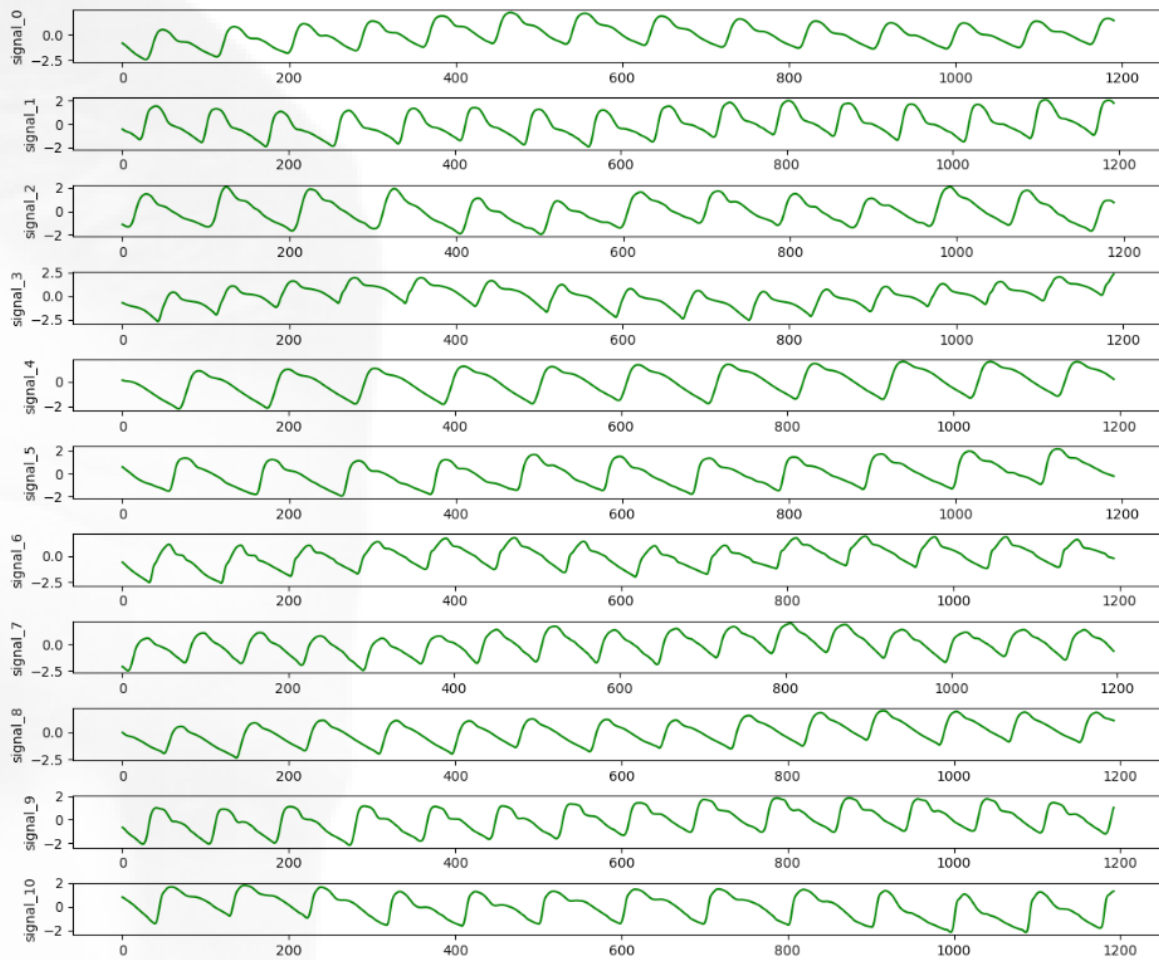


Figure 7: The drawing of 10 random signals from the “moderated_excel.csv” database

Brief description of the signal processing and analysis procedure (Radovanović et al., 2025):

The recorded PPG signals (Figure 7), which after sorting the database were placed in the database named “moderated_excel.csv” (Figure 6), were transformed using the wavelet transformation with the help of the code named “wavedec_csv.py”. This code generates a database named “wavelet_transformed_rbio3.3_level_7_db1_500.csv”.

The database “wavelet_transformed_rbio3.3_level_7_db1_500.csv” contains the transformed PPG signals used for training the network (Radovanović et al., 2025).

The transformation was performed in the following way:

The wavelet transform of the signal is performed using the Python built-in function `wavedec`, the inverse transform is performed using the Python function `waverec`.

The PPG signal was transformed by wavelet transformation, the transformation coefficients “0, 1, 4, 5, 6, 7” were modified i.e., overwritten with 0 (Figure 8), then the inverse transformation of the modified signals is performed, so that the reconstructed signal is used for training the network.

For the wavelet transformation in the Python programming environment, a library called `PyWavelets` was used. This library provides a comprehensive set of functions and tools for wavelet analysis and wavelet-based signal processing and also enables various wavelet transforms of signals, including discrete (dwt, `wavedec`), continuous (cwt), and inverse transforms.

PyWavelets supports a wide range of predefined groups of wavelets, such as Daubechies, Haar, Coiflets, Symlets, rbior, and others. Each of these groups of wavelets has different characteristics and provides flexibility in choosing the appropriate wavelet function for analysis. PyWavelets provides tools for plotting wavelet transforms of signals and wavelet coefficients. Wavelet functions and spectrograms can also be plotted (URL2) (URL4) (URL5).

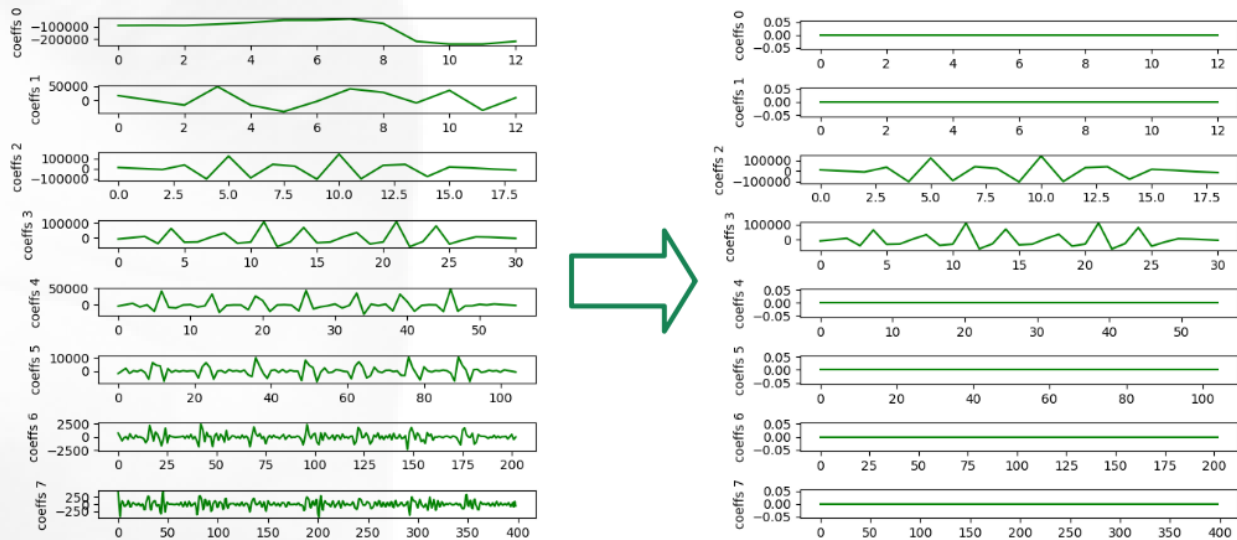


Figure 8: *Modification of wavelet transform coefficients*

A neural network consists of sets of artificial neurons (often called layers) that process data and perform complex tasks such as classification, regression, shape recognition, etc. In Python, neural networks (URL6) can be implemented using various libraries such as TensorFlow, Keras, PyTorch, and others (URL2).

General procedure for implementing a neural network in the Python programming environment (URL2) (URL6) (URL7):

Installation of libraries needed to work with neural networks.

Preparation and loading of data that will be used for neural network training. The data should be in a format suitable for the neural network, for example, strings from the NumPy library or DataFrame from the pandas library.

Defining the network architecture that corresponds to the specific task. This includes the choice of layers, the number of neurons in each layer, the choice of activation functions, etc. Network implementation can be done using library functions or by defining a network class intended for a specific task.

Initialization of network parameters such as weight and bias. Different initialization methods can be used, such as random initialization or pre-trained weights.

Network training can be performed using a forward and back propagation algorithm (e.g., gradient descent). It is also necessary to define the loss function that would be minimized during training. The network needs to be trained iteratively, adjusting the weights and bias towards optimal values.

Validation and testing. After the training, with the help of the data set for validation, the network's performance is evaluated. Evaluation metrics such as accuracy, precision, responsiveness, or other metrics can be used. Also, the network should be tested on an independent data set to evaluate its overall performance.

Optimization and setting of parameters. If the network does not achieve certain performance, the procedure can be repeated with different network parameters, such as the number of layers (topic of this work), number of neurons, learning speed, regulation, dropout, etc. Adjusting these parameters can improve network performance.

A brief description of the libraries and functions used in the Python programming environment for generating and testing neural networks (URL4) (URL5) (URL6):

pandas: Pandas is a library for data manipulation and analysis. It provides data structures such as DataFrame (a tabular data format) and Series (a one-dimensional data structure). In this paper, pandas is used to load data from a CSV file, manipulate the data, and convert the data into a suitable format for training a neural network.

numpy: NumPy is a library for numerical operations in Python. It provides efficient data structures for working with multidimensional arrays and matrices, as well as a large number of mathematical functions for data manipulation. In this paper, NumPy is used to convert data to NumPy arrays and perform numerical operations during training and evaluation of a neural network.

sklearn.model_selection.train_test_split: train_test_split is a function from scikit-learn that is used to split data into training and testing sets. This function randomly splits the data in a certain ratio between the training and testing sets. In this paper, train_test_split is used to split the data into training and testing input data sets to evaluate the performance of the model.

tensorflow.keras.models.Sequential: Sequential is a class from Keras, which is part of the TensorFlow deep learning library. This class is used to create sequential neural network models, where layers are added one after the other. In this paper, Sequential is used to define the model architecture.

tensorflow.keras.layers.Dense: Dense is a Keras class that represents a layer with fully connected neurons in a neural network. A layer with fully connected neurons means that all neurons in the previous layer are connected to every neuron in the current layer. In this paper, Dense is used to add fully connected layers to the model.

tensorflow.keras.preprocessing.sequence.pad_sequences: pad_sequences is a function from the Keras library used to add padding to sequences. This function ensures that all sequences have the same length by padding shorter sequences with zeros. In this paper, pad_sequences is used to add padding to transformed data sequences.

FINDINGS

In this paper, the neural network concept is based on the RNN (Recurrent Neural Network) ((URL3) Goodfellow et al., 2016: 367–415) network, which is designed on five different architecture models. Each model represents a network with one, two, three, four, and five layers. The number of layers to be tested is the subject of optimization and parameter setting. Each layer has a different number of neurons (Table 1).

For validation, metrics from the tensorflow library will be used, which are suitable for regression networks and prediction of continuous values (URL9):

MAE (Mean Absolut Error): Calculates the average of the absolute differences between the true values (y_i) and the predicted values ($\hat{y}_i$).

$$MAE = \frac{1}{n} \sum_{i=1}^n |y_i - \hat{y}_i| \quad (3)$$



MSE (Mean Squared Error): Calculates the average of the squared differences between the true and predicted values.

$$MSE = \frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2 \quad (4)$$

The results of the prediction of the neural network represent a type of validation of the method based on the wavelet transform.

Tabular representation of the architecture of the five neural network models that will be tested (Table 1):

Table 1: Configuration view of five different tested models

Model	Input layer	First hidden layer	Second hidden layer	Third hidden layer	Fourth hidden layer	Fifth hidden layer	Output layer
1	100	30					1
2	64	32	16				1
3	64	32	16	8			1
4	64	32	16	8	4		1
5	128	64	32	16	8	4	1

GENERATING RNN MODELS

The following code shows the generation of an RNN training model. It could be said that training a prediction network and testing it on the same data is actually a methodological error: a model that just repeated the patterns it was just familiar with would have a perfect score, but it would fail to predict anything useful on the data it was unfamiliar with. This situation is “jargonically” called “overfitting”. To avoid this, it is common practice when performing (supervised) network training to keep part of the available data as a test data set. The following code shows the training of the network, where the transformed PPG signal file is used for training:

input file (transformed PPG signals):

```
csv_waverec_file = 'wavelet_transformed_rbior3.3_level_7_db1_500.csv'
```

output generated models for five configurations:

model with one hidden layer:

```
output_file_1 = './model/model_1_epoch_100_batch_size_8.h5';
```

model with two hidden layer:

```
output_file_2 = './model/model_2_epoch_100_batch_size_8.h5';
```

model with three hidden layer:

```
output_file_3 = './model/model_3_epoch_100_batch_size_8.h5';
```

model with four hidden layer:

```
output_file_4 = './model/model_4_epoch_100_batch_size_8.h5';
```

model with five hidden layer:

```
output_file_5 = './model/model_5_epoch_100_batch_size_8.h5';
```



Below is the code in the python programming environment where the models are defined:

```
import ast
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.utils import pad_sequences
from keras.callbacks import History
history_1 = History()
history_2 = History()
history_3 = History()
history_4 = History()
history_5 = History()
# load the .csv file
csv_waverec_file = '../csv_wavelet_transformed/wavelet_transformed_rbior3.3_level_7_db_1_500_1.csv';
df = pd.read_csv(csv_waverec_file);
# Convert 'Coefficients' from string to list using ast.literal_eval
df['data'] = df['data'].apply(lambda x: ast.literal_eval(x) );
sequences = df['data'].values;
# padding
X = pad_sequences( sequences,
                  maxlen=2000,
                  padding='post' );
y = df['age'].values
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.1, random_state=42);
# Model architecture remains the same
model_1 = Sequential()
model_2 = Sequential()
model_3 = Sequential()
model_4 = Sequential()
model_5 = Sequential()

#model_1
# Add the input layer
model_1.add(Dense(100, input_dim=len(X[0]), activation='tanh'))
# Add the first hidden layer
model_1.add(Dense(30, activation='sigmoid'))
# Add the output layer
model_1.add(Dense(1, activation='linear'))
#model_2
# Add the input layer
model_2.add(Dense(64, input_dim=len(X[0]), activation='tanh'))
# Add the first hidden layer
model_2.add(Dense(32, activation='sigmoid'))

# Add the second hidden layer
model_2.add(Dense(16, activation='sigmoid'))
```

```

# Add the output layer
model_2.add(Dense(1, activation='linear'))
#model_3
# Add the input layer
model_3.add(Dense(64, input_dim=len(X[0]), activation='tanh'))
# Add the first hidden layer
model_3.add(Dense(32, activation='sigmoid'))
# Add the second hidden layer
model_3.add(Dense(16, activation='sigmoid'))
# Add the third hidden layer
model_3.add(Dense(8, activation='sigmoid'))
# Add the output layer
model_3.add(Dense(1, activation='linear'))
#model_4
# Add the input layer
model_4.add(Dense(64, input_dim=len(X[0]), activation='tanh'))
# Add the first hidden layer
model_4.add(Dense(32, activation='sigmoid'))
# Add the second hidden layer
model_4.add(Dense(16, activation='sigmoid'))
# Add the third hidden layer
model_4.add(Dense(8, activation='sigmoid'))
# Add the fourth hidden layer
model_4.add(Dense(4, activation='sigmoid'))
# Add the output layer
model_4.add(Dense(1, activation='linear'))
#model_5
# Add the input layer
model_5.add(Dense(128, input_dim=len(X[0]), activation='tanh'))
# Add the first hidden layer
model_5.add(Dense(64, activation='sigmoid'))
# Add the second hidden layer
model_5.add(Dense(32, activation='sigmoid'))
# Add the third hidden layer
model_5.add(Dense(16, activation='sigmoid'))
# Add the fourth hidden layer
model_5.add(Dense(8, activation='sigmoid'))
# Add the fifth hidden layer
model_5.add(Dense(4, activation='sigmoid'))
# Add the output layer
model_5.add(Dense(1, activation='linear'))
# Model compile
model_1.compile(loss='mean_squared_error', optimizer='adam', metrics=['mae'])
model_2.compile(loss='mean_squared_error', optimizer='adam', metrics=['mae'])
model_3.compile(loss='mean_squared_error', optimizer='adam', metrics=['mae'])
model_4.compile(loss='mean_squared_error', optimizer='adam', metrics=['mae'])
model_5.compile(loss='mean_squared_error', optimizer='adam', metrics=['mae'])

```



```
history_1 = model_1.fit(X_train, y_train, epochs=100, batch_size=8,
                        validation_data=(X_test, y_test), callbacks=[history_1] )
loss_1 = model_1.evaluate(X_test, y_test)
print("Test loss:", loss_1)

history_2 = model_2.fit(X_train, y_train, epochs=100, batch_size=8,
                        validation_data=(X_test, y_test), callbacks=[history_2] )
loss_2 = model_2.evaluate(X_test, y_test)
print("Test loss:", loss_2)

history_3 = model_3.fit(X_train, y_train, epochs=100, batch_size=8,
                        validation_data=(X_test, y_test), callbacks=[history_3] )
loss_3 = model_3.evaluate(X_test, y_test)
print("Test loss:", loss_3)

history_4 = model_4.fit(X_train, y_train, epochs=100, batch_size=8,
                        validation_data=(X_test, y_test), callbacks=[history_4] )
loss_4 = model_4.evaluate(X_test, y_test)
print("Test loss:", loss_4)

history_5 = model_5.fit(X_train, y_train, epochs=100, batch_size=8,
                        validation_data=(X_test, y_test), callbacks=[history_5] )
loss_5 = model_5.evaluate(X_test, y_test)
print("Test loss:", loss_5)

# Save the model
output_file_1 = './model/model_1_epoch_100_batch_size_8.h5';
output_file_2 = './model/model_2_epoch_100_batch_size_8.h5';
output_file_3 = './model/model_3_epoch_100_batch_size_8.h5';
output_file_4 = './model/model_4_epoch_100_batch_size_8.h5';
output_file_5 = './model/model_5_epoch_100_batch_size_8.h5';
model_1.save(output_file_1);
model_2.save(output_file_2);
model_3.save(output_file_3);
model_4.save(output_file_4);
model_5.save(output_file_5);
print ('model_1 saved to', output_file_1);
print ('model_2 saved to', output_file_2);
print ('model_3 saved to', output_file_3);
print ('model_4 saved to', output_file_4);
print ('model_5 saved to', output_file_5);
plt.close('all')
plt.figure()
plt.plot(history_1.history['loss'])
plt.plot(history_2.history['loss'])
plt.plot(history_3.history['loss'])
plt.plot(history_4.history['loss'])
plt.plot(history_5.history['loss'])
plt.title('model loss')
```

```

plt.ylabel('loss')
plt.xlabel('epoch')
plt.legend(['one hidden layer', 'two hidden layer', 'three hidden layer',
           'four hidden layer', 'fife hidden layer'], loc='upper right')
plt.show()
plt.figure()
plt.plot(history_1.history['mae'])
plt.plot(history_2.history['mae'])
plt.plot(history_3.history['mae'])
plt.plot(history_4.history['mae'])
plt.plot(history_5.history['mae'])
plt.title('model mae')
plt.ylabel('mae')
plt.xlabel('epoch')
plt.legend(['one hidden layer', 'two hidden layer', 'three hidden layer',
           'four hidden layer', 'fife hidden layer'], loc='upper right')
plt.show()

```

Algorithm 1: The code in the python programming environment where the models are defined

The result of executing this code is generated prediction models in *.h5 format. Graphs were also generated that show the ratio of loss and MAE values depending on the number of epochs (Figure 9) (Figure 10).

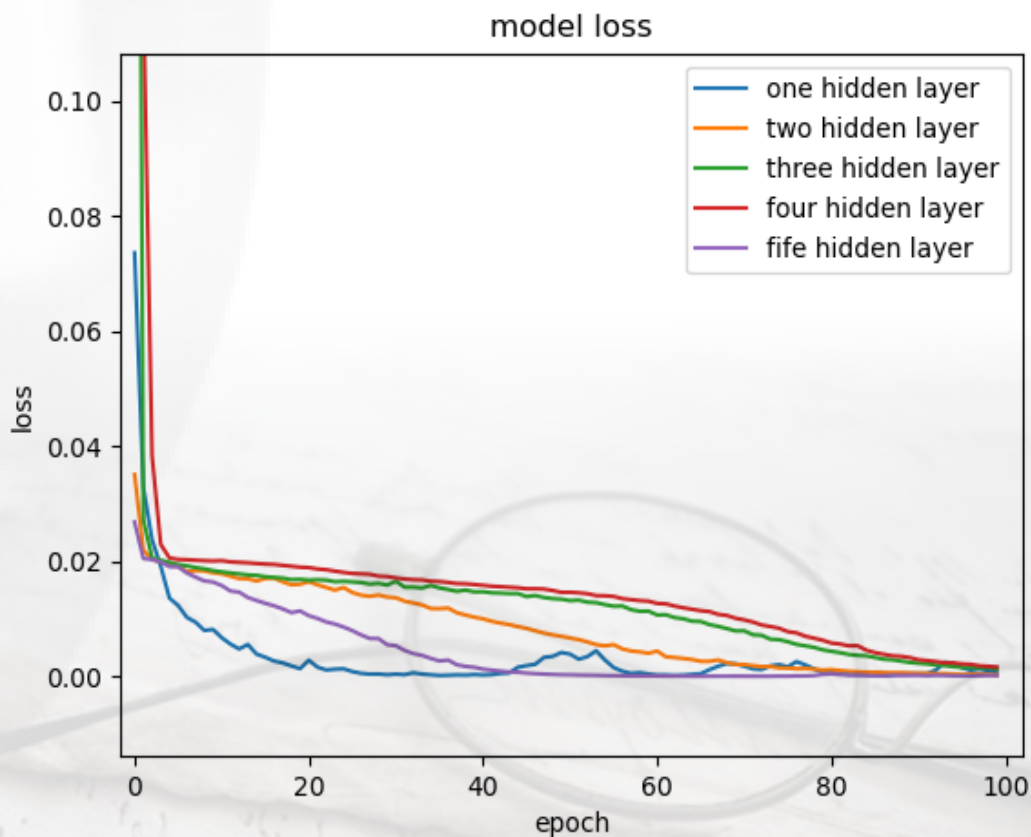


Figure 9: Loss values for five different models



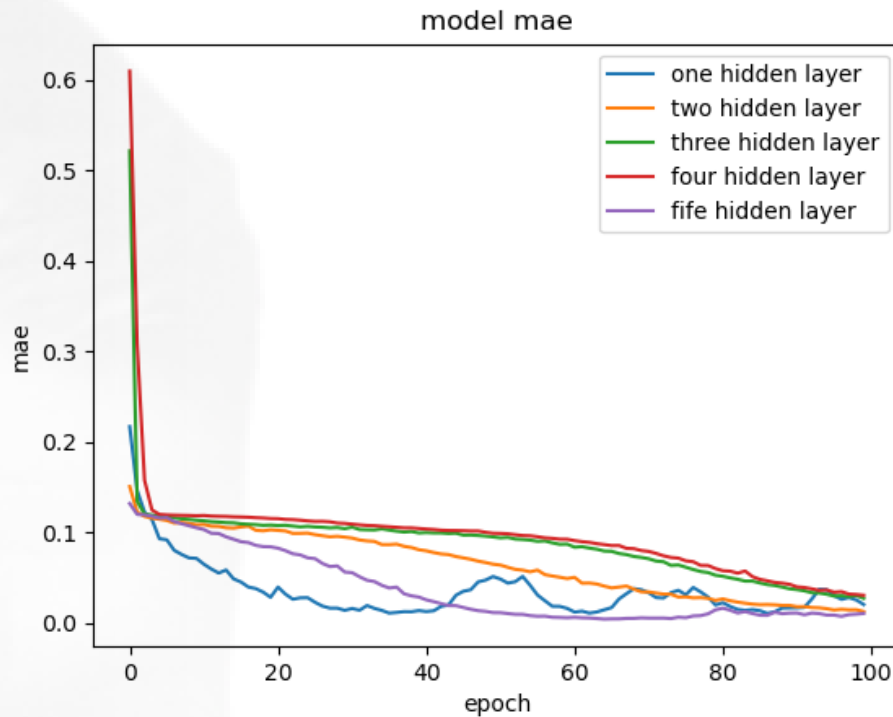


Figure 10: MAE values for five different models

TESTING RNN MODELS

Python code for predicting the subject's age based on the PPG signal transformed by wavelet transformation. Testing the generated model from the previous section will be performed on the PPG signal file:

input file (transformed PPG signals):

```
csv_waverec_file = 'wavelet_transformed_rbior3.3_level_7_db1_500.csv'
```

output files:

model with one hidden layer:

```
outputfile_11 = './prediction/prediction_model_1_epoch_100_batch_size_8.csv'
```

model with two hidden layer:

```
outputfile_21 = './prediction/prediction_model_2_epoch_100_batch_size_8.csv'
```

model with three hidden layer:

```
outputfile_31 = './prediction/prediction_model_3_epoch_100_batch_size_8.csv'
```

model with four hidden layer:

```
outputfile_41 = './prediction/prediction_model_4_epoch_100_batch_size_8.csv'
```

model with five hidden layer:

```
outputfile_51 = './prediction/prediction_model_5_epoch_100_batch_size_8.csv'
```

Below is the code in the python programming environment for testing five different prediction models:


```

import csv
import pandas as pd
import matplotlib.pyplot as plt
from tensorflow.keras.utils import pad_sequences
from tensorflow.keras.models import load_model
from sklearn.metrics import mean_absolute_error, mean_squared_error

# load the model
model_1 = load_model('./model/model_1_epoch_100_batch_size_8.h5');
model_2 = load_model('./model/model_2_epoch_100_batch_size_8.h5');
model_3 = load_model('./model/model_3_epoch_100_batch_size_8.h5');
model_4 = load_model('./model/model_4_epoch_100_batch_size_8.h5');
model_5 = load_model('./model/model_5_epoch_100_batch_size_8.h5');

# load the .csv file
csv_waverec_file = './csv_waverec_transformed/waverec_transformed_rbior3.3_level_7_db_1_500_1.csv';
input_data = pd.read_csv(csv_waverec_file);

# extract data from the DataFrame
ppg_signals_wt = input_data['data'].apply(eval).tolist();
correct_ages = input_data['age'].values*100;
data_id = input_data['id'].values;
ppg_signals_wt = pad_sequences(ppg_signals_wt, maxlen = 2000, padding = 'post');

# predict the age for each PPG signal
ages_predicted_1 = model_1.predict(ppg_signals_wt)*100;
ages_predicted_2 = model_2.predict(ppg_signals_wt)*100;
ages_predicted_3 = model_3.predict(ppg_signals_wt)*100;
ages_predicted_4 = model_4.predict(ppg_signals_wt)*100;
ages_predicted_5 = model_5.predict(ppg_signals_wt)*100;
outputfile_11 = './prediction/prediction_model_1_epoch_100_batch_size_8.csv'
outputfile_21 = './prediction/prediction_model_2_epoch_100_batch_size_8.csv'
outputfile_31 = './prediction/prediction_model_3_epoch_100_batch_size_8.csv'
outputfile_41 = './prediction/prediction_model_4_epoch_100_batch_size_8.csv'
outputfile_51 = './prediction/prediction_model_5_epoch_100_batch_size_8.csv'

def write_prediction (correct_ages, ages_predicted, outputfile, model):
    y_true = []; y_pred = [];
    with open(outputfile, 'w', newline = "") as output_file:
        mae = mean_absolute_error(correct_ages, ages_predicted)
        mse = mean_squared_error(correct_ages, ages_predicted)

        writer = csv.writer(output_file);
        writer.writerow(['data_id', 'actual_age', 'predicted_age']); # write header row

    for i in range(len(correct_ages)):
        print(f"data_id:{(data_id[i])}, Actual Age: {round(correct_ages[i])},
            Predicted Age: {round(ages_predicted[i][0])}");

```



```

# write the data to the output csv file
writer.writerow( [data_id[i], round(correct_ages[i]),
                  round(ages_predicted[i][0])] );
y_true.append(round(correct_ages[i]) );
y_pred.append(round(ages_predicted[i][0]) );

writer.writerow(['Mean Absolute Error:', round(mae)]);
writer.writerow(['Mean Squared Error:', round(mse)]);

print(f"Mean Absolute Error: {round(mae)}")
print(f"Mean Squared Error: {round(mse)}")
print ('prediction saved to', output_file);

fig, ax = plt.subplots(figsize=(10,5))
plt.title(f"{model}")
ax.plot(range(len(y_true)), y_true, '-b',label='Actual')
ax.plot(range(len(y_pred)), y_pred, '-r', label='Predicted')
ax.legend(loc="lower right")
plt.show()
return mae, mse, y_true, y_pred
plt.close('all')
mae_11, mse_11, y_true_1_11, y_pred_1_11 = write_prediction(correct_ages, ages_predicted_1,
                  outputfile_11, 'model 1 \n one hidden level')
mae_21, mse_21, y_true_1_21, y_pred_1_21 = write_prediction(correct_ages, ages_predicted_2,
                  outputfile_21, 'model 2 \n two hidden level')
mae_31, mse_31, y_true_1_31, y_pred_1_31 = write_prediction(correct_ages, ages_predicted_3,
                  outputfile_31, 'model 3 \n three hidden level')
mae_41, mse_41, y_true_1_41, y_pred_1_41 = write_prediction(correct_ages, ages_predicted_4,
                  outputfile_41, 'model 4 \n four hidden level')
mae_51, mse_51, y_true_1_51, y_pred_1_51 = write_prediction(correct_ages, ages_predicted_5,
                  outputfile_51, 'model 5 \n five hidden level')
mae = [mae_11, mae_21, mae_31, mae_41, mae_51];
mse = [mse_11, mse_21, mse_31, mse_41, mse_51];
hidden_layer = [1, 2, 3, 4, 5]
fig, ax = plt.subplots(figsize=(10,5))
ax.plot(hidden_layer, mae, '-b',label='MAE')
ax.plot(hidden_layer, mse, '-r', label='MSE')
ax.legend(loc="upper right")
plt.show()

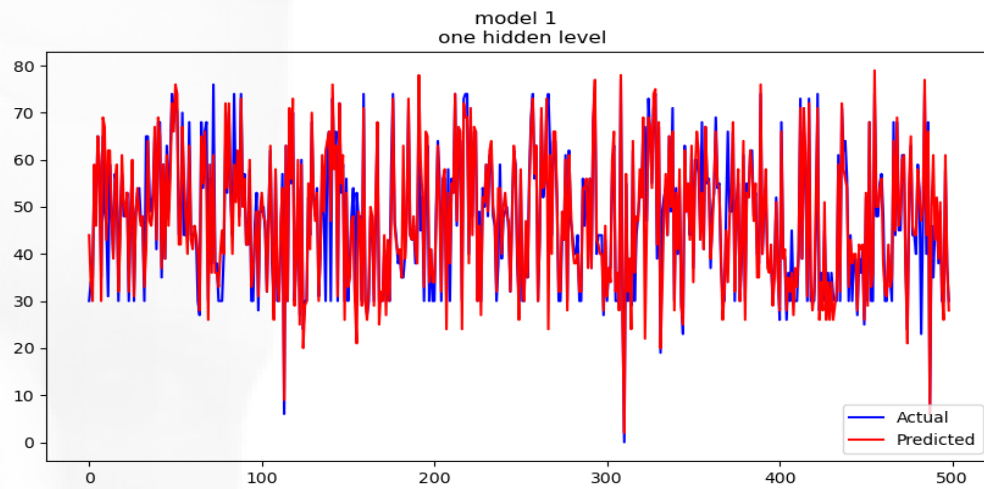
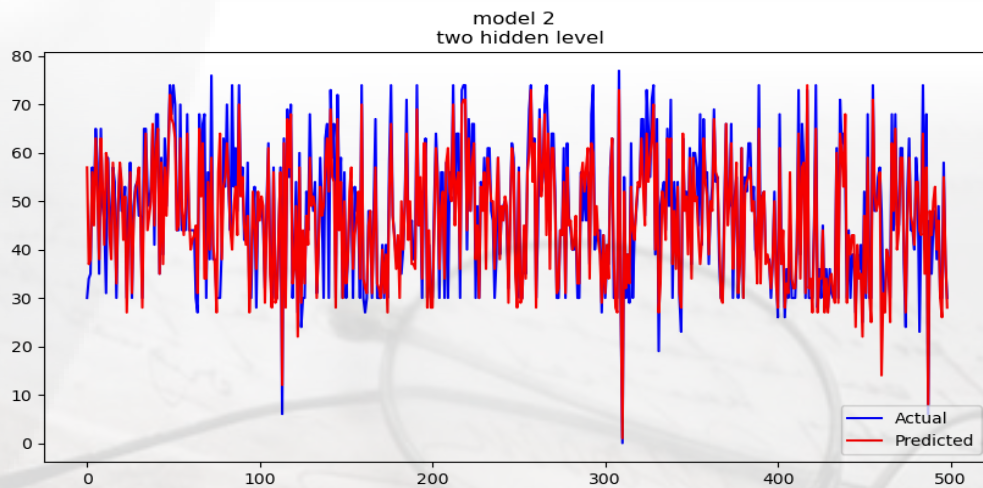
```

Algorithm 2: *The code in the python programming environment for testing five different prediction models*

As a result of executing this code, a table of MAE and MSE values is generated for each defined model (Table 2). A graphic representation of the dependence of the number of hidden layers and the values of MAE and MSE is shown in Figure 16. Five graphs are also generated where the current value and prediction are shown for each defined model (Figure 11) (Figure 12) (Figure 13) (Figure 14) (Figure 15).

Table 2: MAE and MSE testing results for five different models

MODEL	MAE	MSE
1	3	36
2	4	44
3	4	41
4	5	54
5	3	33

**Figure 11:** Display of actual values and predictions for a model with one hidden layer**Figure 12:** Display of actual values and predictions for a model with two hidden layers

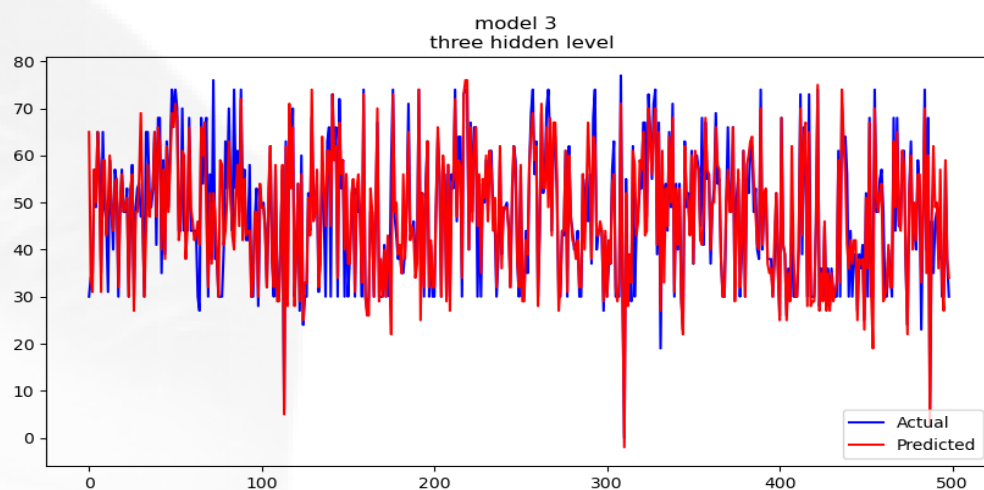


Figure 13: Display of actual values and predictions for a model with three hidden layers

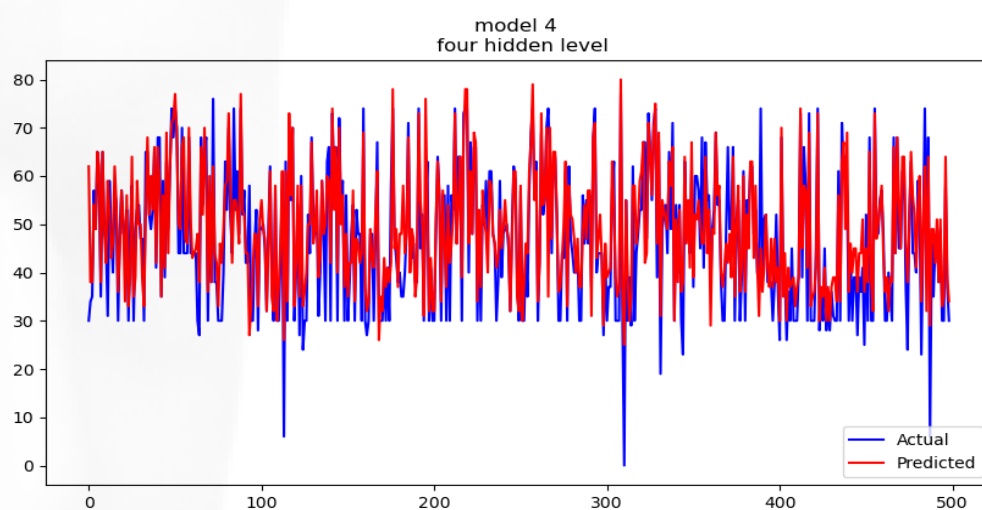


Figure 14: Display of actual values and predictions for a model with four hidden layers

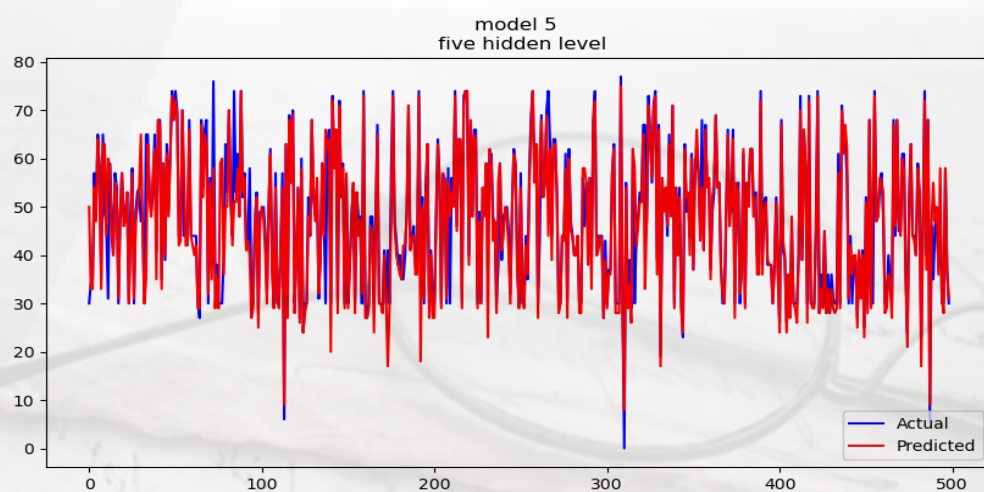


Figure 15: Display of actual values and predictions for a model with five hidden layers

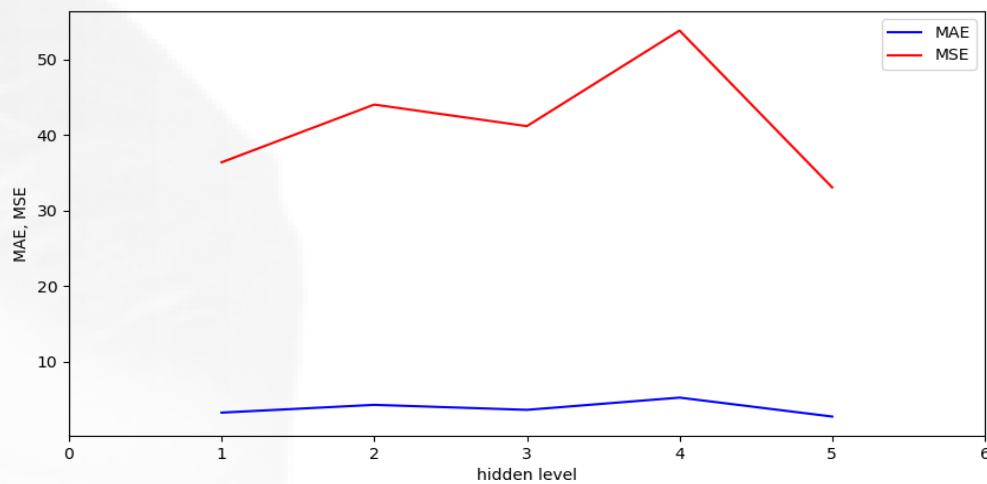


Figure 16: Display of MAE and MSE values in relation to the number of hidden layers

ORIGINALITY/VALUE

This paper presents the concept of an RNN network for prediction based on the recorded PPG signal. The PPG signal was transformed by wavelet transform. The network concept is set on five models, where each model has one layer more than the previous one.

In this way, the performance of the network was tested depending on the number of hidden layers. It is important to note that for regression prediction of continuous PPG signal values, it is necessary to adequately prepare the data, properly define the network architecture, train the network on a large data set, and regularly monitor and adjust the model parameters in order to achieve the best possible performance (URL2).

From the testing performed in this paper and based on the generated graphs and tabular displays, it can be concluded that the model with five hidden layers is more accurate than the other models. The topic of further work is testing with a larger data set.

If the graphic analyzed in figures 9, 10, and 16 is considered, a conclusion can be reached that the model with a larger number of hidden layers is more accurate at a smaller number of epochs and that the precision equalizes as the number of epochs increases. If the graphic is analyzed in figure 11, 12, 13, 14, and 15, it can be concluded that the actual value and the prediction have the most overlap in models with a larger number of hidden layers.

A discussion is opened for further work and testing on whether to increase the number of epochs or the number of hidden layers, training the network on a diverse and representative data set, which is very important for analyzing PPG signals, testing and setting up the CNN (Convolutional Neural Network) network for analyzing and classifying PPG signals, and comparing CNN results with RNN results.

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- (URL8) <https://play.google.com/store/apps/details?id=srb.ctb.pulse.heartrate.camera.ecg4everybody>
(the application through which the PPG signals used in this work were collected and generated in a file)
- (URL9) <https://apxml.com/courses/getting-started-with-tensorflow/chapter-4-training-evaluating-models/compiling-metrics>

DATA-DRIVEN INTELLIGENCE IN DRUG CRIME PREVENTION: PREDICTIVE ANALYTICS, CASE STUDIES, AND ETHICAL PERSPECTIVES

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ABSTRACT

Purpose: This paper aims to synthesize current evidence on predictive analytics for drug crime prevention, examining the technical foundations, real-world applications, ethical implications, and emerging regulatory frameworks. Drug-related crime poses multifaceted challenges spanning public health, security, and governance. The purpose is to provide a comprehensive overview that integrates insights from criminology, data science, public health, and policy studies to guide evidence-based implementation of predictive tools in drug enforcement while addressing critical concerns about bias, privacy, and accountability.

Design/Methods/Approach: We employ a systematic literature review methodology, examining academic research, technical reports, policy documents, and case evaluations from diverse jurisdictions. The review covers analytic foundations (near-repeat models, risk terrain modeling, spatio-temporal forecasting, network analytics), data integration challenges, and application domains ranging from hotspot policing to online trafficking intelligence and overdose early-warning systems. Case studies from the United States, European Union, and Asia-Pacific regions illustrate implementation successes and failures. We critically assess effectiveness evidence through randomized controlled trials, quasi-experimental studies, and audit reports, while examining ethical and legal frameworks including the EU AI Act's provisions on predictive policing and high-risk AI systems.

Findings: Evidence demonstrates that spatio-temporal forecasting and environmental risk modeling can improve resource allocation and crime prevention when implemented with adequate governance. Randomized field trials show gains over analyst baselines in specific contexts. However, person-based risk scoring has encountered significant challenges related to construct validity, data drift, and fairness concerns, leading to decommissioning in several jurisdictions. Public health integration through overdose surveillance systems (e.g., ODMAP) enables effective early warning and intervention. Critical barriers include data quality issues, algorithmic bias amplifying structural inequalities, transparency deficits hindering accountability, and tensions between enforcement efficiency and civil liberties. The EU AI Act's prohibition of predictive policing applications and stringent requirements for high-risk AI reflect growing regulatory scrutiny.

Originality/Value: This paper provides a comprehensive synthesis bridging technical analytics, empirical evaluation, and normative concerns in drug crime prediction. It advances understanding by: (1) systematically mapping the distinct characteristics of drug markets that shape analytic requirements; (2) connecting enforcement applications to public health surveillance and harm reduction strategies; (3) critically examining fairness trade-offs and inherent limitations of algorithmic prediction; (4) situating predictive policing within evolving regulatory frameworks, notably the EU AI Act;

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and (5) proposing practical safeguards and research priorities. The work contributes to responsible innovation by emphasizing that predictive tools should complement, not replace, comprehensive strategies centered on public health, prevention, community trust, and social equity. For practitioners and policymakers, it offers evidence-based guidance on when and how to deploy analytics while managing risks and maintaining legitimacy.

Keywords: predictive policing; drug markets; overdose surveillance; algorithmic fairness; EU AI Act; risk terrain modeling; near-repeat analysis; spatio-temporal forecasting

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INTRODUCTION

Illicit drug markets undermine public safety and well-being across multiple dimensions: trafficking fuels violence and organized crime, corrodes institutions through corruption, strains health systems with addiction and overdose crises, and generates enormous social and economic costs (EMCDDA & Europol, 2024; UNODC, 2024). The scale and adaptability of these markets—characterized by the rapid emergence of new psychoactive substances, shifting smuggling routes, sophisticated money laundering networks, and coordination through encrypted digital platforms—pose formidable challenges to conventional law enforcement approaches that rely primarily on reactive investigation and interdiction.

In response to these challenges, many jurisdictions have experimented with data-driven methods broadly referred to as predictive policing, which aim to anticipate crime patterns and deploy resources proactively rather than reactively (Perry et al., 2013; Storbeck, 2022). These approaches promise to shift law enforcement from responding to crimes after they occur to preventing them through strategic intervention at predicted times and locations, or by targeting individuals and networks assessed as high-risk. The theoretical appeal is compelling: by leveraging large datasets, advanced analytics, and machine learning algorithms, police agencies could theoretically optimize resource allocation, disrupt criminal networks before they cause harm, and ultimately reduce crime rates and associated social costs.

However, the practical implementation of predictive analytics in policing has proven far more complex and controversial than early proponents anticipated. The initial enthusiasm—when predictive policing was often portrayed as a revolutionary ‘crystal ball’ capable of forecasting crime with near-perfect accuracy—has given way to a more sober understanding of both the potential and the limitations of these tools. As Mátyás et al. (2025) observe, predictive policing was a ‘magic word’ for a long time, with many expecting miracles and 100% accuracy. When reality failed to meet these inflated expectations, disillusionment followed, and many stakeholders turned away from these technologies altogether.

The history of predictive policing illustrates this trajectory. The first predictive policing software was developed in Hungary in 2004, capable of predicting five types of property crimes. American and



Italian systems followed, and the 2010s saw a proliferation of hundreds of software tools claiming to predict various crime types with varying degrees of efficiency. It appeared that predictive analytics might indeed revolutionize policing practice. However, by the late 2010s and early 2020s, significant concerns about civil liberties, fairness, and effectiveness emerged. Human rights organizations raised alarms about ethnic profiling, discriminatory impacts on marginalized communities, and lack of transparency and accountability. These concerns led to the discontinuation of predictive policing programs in numerous jurisdictions. Even prominent systems like PredPol (later rebranded as Geolitics) faced discontinuation in major cities such as Los Angeles following audits that revealed implementation problems, inconclusive evidence of effectiveness, and civil rights concerns (LAPD OIG, 2019).

This paper aims to provide a comprehensive, evidence-based assessment of predictive analytics in drug crime prevention. We first outline what makes drug-related crime different from other offense types and why these differences matter for analytic approaches. We then review the analytic foundations—including near-repeat dynamics, risk terrain modeling, spatio-temporal forecasting, and network analytics—and examine the diverse data sources that feed predictive systems. Subsequently, we explore application areas ranging from hotspot policing and targeted patrol deployment to online trafficking intelligence, overdose early-warning systems, and prevention-oriented interventions. Illustrative case studies from the United States, Europe, and Asia demonstrate real-world implementations, highlighting both successes and failures.

Critically, we evaluate the evidence of effectiveness through randomized controlled trials, quasi-experimental studies, and audit reports, finding mixed results that depend heavily on context, implementation quality, and the specific type of predictive tool deployed. We then examine ethical, legal, and social considerations, including algorithmic bias and disparate impact (Lum & Isaac, 2016; Barocas & Selbst, 2016), inherent fairness trade-offs (Kleinberg et al., 2017), transparency and accountability deficits, privacy concerns, and evolving regulatory frameworks such as the EU AI Act (Regulation (EU) 2024/1689), which explicitly prohibits certain predictive policing applications and imposes stringent requirements on high-risk AI systems in law enforcement.

The authors bring practical experience to this analysis, having worked for years on both the criminology of drug crime and the development and evaluation of predictive policing technologies. In 2024, they participated in the development of accident prediction software, which inspired them to address the question of how drug-related crime can be predicted in principle and practice. This study represents the first stage of ongoing research aimed at laying theoretical foundations. The second stage will involve reviewing and processing several hundred drug-related criminal cases from Hungary to develop algorithms potentially suitable for predicting drug-related crimes. If permissions are obtained, the research will also incorporate camera surveillance data and geographical factors—such as settlement structure (Bói, 2024) and hotspot patterns (Vajda, 2024)—which play significant roles in drug crime commission.

While the role of predictive analytics has diminished in many Western countries due to civil liberties concerns and disappointing results, other nations—including China, India, and several Southeast Asian countries—continue to expand their use of predictive technologies in law enforcement. This divergence reflects different governance philosophies, legal frameworks, and societal priorities regarding the balance between security and privacy. The authors maintain that software itself cannot be inherently racist or discriminatory, but its design, implementation, and use must rigorously protect human rights, human dignity, and equal treatment regardless of race, ethnicity, origin, language, religion, or other protected characteristics. With appropriate algorithmic design, governance safeguards, and oversight mechanisms, predictive software can have a legitimate and valuable place in law en-



forcement—provided it complements rather than replaces comprehensive strategies centered on public health, prevention, community partnership, and social equity.

WHY DRUG-RELATED CRIME IS DIFFERENT

Drug-related crime differs from conventional offenses in fundamental ways that profoundly shape detection strategies, analytic approaches, and prevention efforts. Understanding these differences is essential for designing effective predictive systems. First, drug offenses are often characterized as ‘victimless crimes’ in the narrow criminal-law sense, meaning there is no immediate complainant reporting the offense to authorities. Unlike robbery, assault, or burglary—where victims typically alert police—drug transactions occur between willing participants (buyers and sellers) who have strong incentives to avoid detection. This consensual nature complicates discovery and means that official statistics on drug crime heavily reflect enforcement patterns and priorities rather than true crime prevalence, introducing significant measurement and reporting biases into any predictive model.

Second, drug markets are organized as multi-level, adaptive networks that span both offline logistics and online marketplaces. Unlike many property crimes committed by individual offenders, drug trafficking involves complex supply chains with distinct roles: cultivation or manufacturing, international smuggling, wholesale distribution, mid-level dealing, and retail sales. These networks exhibit sophisticated organizational structures, often involving connections to broader organized crime groups that also engage in human trafficking, weapons smuggling, money laundering, and corruption. The networks are adaptive, quickly adjusting to enforcement pressure by changing routes, methods, and personnel (EMCDDA & Europol, 2024; UNODC, 2024). This adaptability means that traditional reactive policing may disrupt specific actors or operations but often fails to dismantle the underlying market structures.

Third, drug-related harms cut across multiple domains—health, social, and economic—in ways that require cross-sectoral responses beyond traditional law enforcement. Problematic drug use contributes to addiction, overdose mortality, infectious disease transmission (HIV, hepatitis C), mental health crises, family disruption, and community destabilization. The recent surge in synthetic opioid-related overdoses, particularly involving fentanyl and its analogues, has created a public health emergency in many countries. Effective responses therefore require integration of public health interventions—including harm reduction, treatment access, overdose prevention, and social support services—with enforcement efforts. Predictive analytics can support this integration by identifying not only enforcement targets but also locations and populations where health interventions are most urgently needed.

Fourth, the drug market is highly dynamic, characterized by continuous innovation and evolution. Novel psychoactive substances (NPS) appear regularly, often designed to circumvent existing legal controls. Smuggling routes shift in response to interdiction efforts, with traffickers exploiting new transit countries, transportation methods, and concealment techniques. Retail modalities evolve rapidly, moving from traditional street corners to encrypted messaging apps, social media platforms, and darknet markets that offer anonymity and international reach. This dynamism requires predictive systems that can adapt to emerging patterns and integrate real-time intelligence rather than relying solely on historical crime data.

Fifth, the consequences of drug markets extend well beyond drug use itself. Drug-related income fuels organized crime and generates violence through territorial disputes, enforcement of debts, and elimination of rivals. Drug trafficking organizations often infiltrate and corrupt legitimate businesses, transportation hubs (especially ports and airports), financial institutions, and government agencies, undermining rule of law and institutional integrity. The economic costs include not only enforcement



expenditures but also lost productivity, healthcare costs, incarceration expenses, and the broader social costs of addiction and community disruption (EMCDDA & Europol, 2024; UNODC, 2024).

These distinctive features favor proactive, network-aware, intelligence-led, and cross-sector strategies rather than purely reactive, patrol-driven, or arrest-focused policing. Predictive analytics, when properly designed and implemented, can support such strategies by: identifying spatial and temporal patterns in retail drug markets; mapping trafficking networks and supply chains; detecting emerging trends in drug types, prices, and purity; forecasting overdose hotspots to enable rapid public health response; and optimizing allocation of limited enforcement and treatment resources. However, the same features that make drug crime distinctive also create challenges for predictive modeling—including data gaps, measurement bias, network complexity, and the need to balance enforcement objectives with public health and human rights considerations.

ANALYTIC FOUNDATIONS

Spatio-Temporal Forecasting and Near-Repeat Dynamics

Crime science research demonstrates that criminal events cluster in both space and time, exhibiting patterns that can be exploited for prediction. Near-repeat models formalize the observation that one crime event temporarily elevates the risk of subsequent events at the same location or nearby locations. This phenomenon, initially documented for burglary (Short et al., 2009), reflects both offender behavior (repeat targeting of known locations) and broader environmental risk factors. Self-exciting point process models, particularly the Epidemic-Type Aftershock Sequence (ETAS) model borrowed from seismology, provide a mathematical framework for capturing these dynamics. ETAS models treat crime events as having both background rates (driven by long-term environmental factors) and triggering effects (where each event probabilistically generates additional events in its spatial-temporal neighborhood).

Field experiments using ETAS-based predictions have demonstrated practical value. Mohler et al. (2015) conducted a randomized controlled trial in Los Angeles, comparing ETAS-generated hotspot predictions against predictions made by experienced crime analysts. The study found that ETAS forecasts captured significantly more crime events than analyst predictions and that directed patrols based on ETAS predictions reduced crime per patrol hour. This represents some of the strongest experimental evidence for predictive policing effectiveness. However, it is important to note that these results were obtained for specific crime types (primarily property crimes) in a particular operational context, and generalization to drug markets depends on whether drug offenses exhibit similar near-repeat patterns and whether operational implementation achieves adequate ‘dosage’ (i.e., sufficient patrol presence in predicted areas).

Environmental risk and Risk Terrain Modeling (RTM)

Risk Terrain Modeling (RTM) takes a complementary approach by quantifying how environmental features create criminogenic risk fields that interact with offender decision-making and opportunity structures (Caplan & Kennedy, 2016). RTM identifies spatial risk factors—such as transit nodes, liquor outlets, abandoned buildings, cash-intensive businesses, check-cashing stores, and areas with poor surveillance—and models their combined influence on crime risk. For drug-related crime, RTM can help identify settings vulnerable to retail drug markets (e.g., locations with high foot traffic, low



guardianship, and proximity to user populations) as well as locations suitable for drug handling activities such as stash houses, conversion laboratories, and distribution hubs.

The strength of RTM lies in its focus on modifiable environmental features, which can inform not only enforcement deployment but also situational crime prevention strategies (e.g., improving lighting, increasing surveillance, modifying land use) and multi-agency interventions involving urban planning, business licensing, and community development. However, RTM relies on accurate identification of relevant risk factors and assumes that historical correlations between environmental features and crime will persist into the future. It may also suffer from ecological fallacy if used to make inferences about individual behavior based on aggregate spatial patterns.

Network Analytics and Online Intelligence

Drug trafficking is fundamentally a network enterprise, making network analytics a critical component of predictive and intelligence-led approaches. Graph analytics can reveal key actors (high centrality nodes), critical logistical links (bridges connecting otherwise separate subgroups), and structural vulnerabilities in trafficking organizations. Social network analysis, communication network analysis, and financial network analysis can be integrated to map relationships, identify organizational hierarchies, and prioritize disruption targets based on their network position. Removing highly central actors or critical brokers can potentially fragment networks and disrupt operations more effectively than arresting peripheral members.

The shift of drug markets toward online and darknet platforms has created new intelligence opportunities and challenges. Natural language processing (NLP) and machine learning can monitor surface web platforms (social media, forums), darknet marketplaces, and encrypted communication channels to detect emerging drugs, identify vendors and supply sources, track prices and purity trends, and provide early warning of dangerous substances entering the market. However, these methods face technical challenges (platform churn, encrypted content, adversarial evasion), legal constraints (privacy protections, jurisdictional limits), and ethical concerns (surveillance overreach). Integration of online signals with traditional financial intelligence (anti-money laundering / countering terrorist financing or AML/CTF data, suspicious activity reports) and logistics traces (shipping data, border crossings) can support comprehensive supply-chain disruption strategies.

Model Governance, Explainability, and Fairness

The increasing use of complex machine learning models in predictive policing raises critical questions about governance, accountability, and fairness. Black-box algorithms—where predictions are generated through opaque processes that cannot be readily understood or audited by human operators—pose particular challenges for democratic oversight and legal accountability. When a model predicts that a person is at high risk of future offending or that a location will experience crime, what factors drove that prediction? Can the individual or community affected understand and challenge the prediction? Can external auditors verify that the model is not relying on prohibited factors such as race or ethnicity?

Foundational research by Kleinberg et al. (2017) demonstrates that commonly proposed fairness criteria for algorithmic decision-making are mathematically incompatible except under very specific conditions (perfect prediction or equal base rates across groups). For example, equalizing false positive rates across racial groups conflicts with equalizing false negative rates, and both conflict with overall accuracy maximization. This fundamental result underscores that there are inherent trade-offs in fairness, and no single definition of fairness is universally appropriate. Agencies deploying predic-



tive tools must make explicit choices about which fairness criteria they prioritize and why, based on normative considerations and stakeholder input, rather than assuming that fairness can be ‘solved’ through technical means alone.

Furthermore, training data for predictive policing systems inevitably reflect historical enforcement patterns and reporting biases, which can encode and amplify structural inequalities (Barocas & Selbst, 2016; Lum & Isaac, 2016). If police have historically concentrated enforcement in certain neighborhoods or against certain demographic groups—whether due to legitimate crime patterns, resource allocation decisions, or discriminatory practices—then models trained on this data will learn to predict continued patterns of enforcement rather than true underlying crime risk. This creates feedback loops where biased predictions lead to biased deployment, generating new biased data that reinforces the bias. Mitigating these risks requires diverse strategies: careful data auditing and documentation; use of multiple data sources beyond police records; regular monitoring of disparate impact; human oversight of model predictions; community involvement in governance; and transparency measures that enable external accountability.

DATA SOURCES AND INTEGRATION

Predictive systems for drug crime integrate heterogeneous data streams, each contributing unique value while introducing potential biases. Criminal justice data—including incident reports, arrests, calls for service, and drug seizures—provide the primary signal for enforcement patterns but suffer from reporting bias, enforcement bias, latency in recording and geocoding, and incompleteness (many offenses go undetected or unreported). Public health data, particularly emergency medical services (EMS) and emergency department (ED) overdose records accessed through systems like the Overdose Detection Mapping Application Program (ODMAP), enable early warning and rapid response but face coverage gaps, inconsistent definitions across jurisdictions, and underreporting of non-fatal events.

Demographic and socio-economic indicators from census data, administrative records, and surveys provide context for vulnerability mapping and prevention prioritization. However, using socio-economic variables raises ethical concerns about proxying for protected attributes (race, ethnicity, economic status) and potentially stigmatizing already-marginalized communities. Financial intelligence data, including suspicious activity reports (SARs) from banks and money service businesses, can support supply-chain tracing and identification of money laundering typologies, but access is restricted by confidentiality rules and the data contain high rates of false positives. Digital traces from online and darknet marketplaces, social media, and communications metadata offer insights into demand, supply, and emerging trends, but face challenges of platform churn, encryption, scraping restrictions, and legal constraints on collection and use.

Environmental and infrastructure data—including transit networks, land use, points of interest, mobility patterns, and CCTV coverage—support risk terrain modeling and situational analysis. Integration typically occurs through geographic information systems (GIS), data lakes with unified schemas, and application programming interfaces (APIs) enabling real-time data exchange. Successful integration requires attention to data quality (accuracy, completeness, timeliness), semantic interoperability (common definitions and coding schemes), and governance frameworks that specify access controls, retention policies, and audit trails. Table 1 summarizes common data sources, their typical uses, and associated pitfalls.



Table 1. *Common data sources for predictive drug-crime analytics and typical pitfalls*

Data source	Typical use	Common pitfalls
Incident/arrest data	Hotspot maps; trend models	Reporting and enforcement bias; latency; geocoding errors
EMS/ED overdoses (e.g., ODMAP)	Early warning; outreach targeting	Coverage gaps; inconsistent definitions; underreporting non-fatal events
Socio-economic indicators	Vulnerability mapping; prevention prioritization	Proxying protected attributes; outdated/census lag
Financial (SARs, typologies)	Supply-chain tracing; lab detection	Confidentiality constraints; false positives
Online/darknet signals	Demand/supply monitoring; product alerts	Platform churn; scraping bias; legal constraints
Environment/land use	RTM features; situational prevention	Mis-specified risk correlates; ecological fallacy

APPLICATION AREAS

Predictive analytics for drug crime find application across multiple operational and strategic domains. Spatial and temporal analysis encompasses hotspot forecasting, risk terrain overlays, and diffusion-of-benefits analysis to optimize patrol deployment and intervention targeting (Perry et al., 2013; Caplan & Kennedy, 2016; Mohler et al., 2015). Network and behavioral analysis includes transport route mining, clandestine laboratory detection, precursor chemical tracking, criminal network mapping to identify high-value targets, and behavioral pattern recognition such as delivery windows and payment methods. Prevention and community intervention applications involve socio-structural risk mapping to target social services, demand-side prediction to guide treatment outreach and harm reduction programs, and community resilience modeling to identify protective factors. Operational and strategic support includes tactical deployment planning, event security assessments, online trafficking and darknet monitoring using natural language processing, and multi-agency intelligence fusion with governance workflows for information sharing and coordinated action.

CASE STUDIES

United States

The United States has witnessed extensive experimentation with predictive policing technologies, producing both promising results and cautionary lessons. The randomized controlled trial conducted in Los Angeles by Mohler et al. (2015) represents some of the strongest experimental evidence for predictive policing effectiveness. Using the ETAS (Epidemic-Type Aftershock Sequence) model to generate crime forecasts, researchers found that algorithmic predictions captured significantly more property crime events than predictions made by experienced crime analysts, and that directed patrols based on ETAS forecasts reduced crime per patrol hour without simply displacing crime to adjacent areas. This study demonstrated that rigorous mathematical modeling of spatio-temporal crime



dynamics can improve resource allocation and crime prevention outcomes when implemented with adequate operational compliance.

However, person-based predictive tools have encountered significant challenges. Chicago's Strategic Subject List (SSL), later rebranded as the Crime and Victimization Risk Model (CVRM), aimed to identify individuals at high risk of involvement in gun violence, either as perpetrators or victims. An investigation by the Chicago Office of Inspector General (2020) revealed fundamental problems: data quality issues that undermined model validity, inadequate documentation and version control, lack of rigorous evaluation to determine whether the tool actually reduced violence, and absence of clear protocols for how officers should use risk scores in practice. The tool generated concerns about creating watch lists without due process, potential for harassment of individuals based on algorithmic predictions, and disproportionate impact on African American and Latino communities. Following the audit, Chicago decommissioned the system, illustrating the reputational and operational risks of deploying inadequately validated person-based risk tools.

The Los Angeles Police Department's experiences with data-driven strategies provide additional lessons. An audit by the LAPD Inspector General (2019) examined two major initiatives: the LASER (Los Angeles Strategic Extraction and Restoration) program, which combined place-based and person-based targeting, and the use of PredPol software for hotspot prediction. The audit identified inconsistent implementation across divisions, inconclusive evidence regarding crime reduction effectiveness, concerns about community trust impacts, and inadequate documentation of decision-making processes. These findings contributed to program reforms and eventual discontinuation. Investigative journalism by organizations such as The Markup has further documented problems with predictive policing deployments nationwide, reporting exceedingly low hit rates (predictions that fail to materialize), feedback loops where predictions drive enforcement that generates data confirming predictions, and disparate impacts on communities of color (Sankin & Mattu, 2023).

In parallel with these mixed enforcement experiences, public health applications of predictive analytics have shown more consistent success. The Overdose Detection Mapping Application Program (ODMAP) has achieved national adoption as a real-time overdose surveillance system. ODMAP enables emergency medical services, hospitals, and law enforcement agencies to share overdose incident data rapidly, creating early warning capacity for identifying geographic and temporal spikes in overdoses that may indicate presence of particularly dangerous drug batches (e.g., fentanyl-contaminated supplies). When integrated with rapid public health responses—including targeted distribution of naloxone, public health alerts, enhanced outreach to at-risk populations, and offers of treatment access—ODMAP has demonstrated clear value in harm reduction and overdose prevention (Washington/Baltimore HIDTA, n.d.). This success suggests that predictive analytics may be most effective when oriented toward health outcomes and when embedded in comprehensive multi-sector response systems rather than used primarily for punitive enforcement.

Europe

European approaches to predictive analytics in drug enforcement generally emphasize legality, proportionality, and privacy protection, reflecting the region's stronger data protection frameworks and human rights traditions. The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) and Europol have jointly documented escalating drug-related violence, particularly associated with cocaine trafficking through major European ports (Rotterdam, Antwerp, Hamburg), and the infiltration of legitimate logistics and port operations by organized crime groups (EMCDDA & Europol, 2024). These agencies call for advanced detection capabilities, improved coordination among member



states, and intelligence-led strategies to disrupt trafficking networks while acknowledging the need to balance security objectives with fundamental rights protections.

Member states have piloted various analytic approaches, typically under strict legal constraints imposed by the General Data Protection Regulation (GDPR) and national data protection laws. Many initiatives combine community policing philosophies with intelligence-led targeting, emphasizing partnership between law enforcement and social services. Predictive tools are generally framed as decision-support systems to optimize resource allocation rather than as automated decision-making systems. The EU AI Act (Regulation (EU) 2024/1689), adopted in 2024, significantly constrains the future of predictive policing in Europe by explicitly prohibiting AI systems intended to predict criminal offenses based solely on profiling individuals or assessing personality traits, and by classifying law enforcement AI systems as high-risk, thus subjecting them to stringent requirements including risk management systems, data governance and quality standards, comprehensive documentation, transparency obligations, human oversight, accuracy and robustness requirements, and incident reporting (EUR-Lex, 2024). These provisions reflect a policy decision to prioritize fundamental rights protection and democratic oversight over potential efficiency gains from predictive technologies.

Asia-Pacific

Approaches to predictive policing in Asia-Pacific countries vary dramatically, reflecting diverse governance systems, legal frameworks, and cultural contexts. China has integrated predictive analytics into extensive surveillance infrastructure, including facial recognition systems, social credit scoring, predictive policing platforms, and mass data collection from digital communications and movements. While Chinese authorities report operational successes in crime prevention and social control, these systems raise profound concerns about transparency, lack of independent oversight, mass surveillance, and systematic human rights violations, particularly regarding the targeting of ethnic and religious minorities in regions such as Xinjiang (Sprick, 2019). The Chinese model represents an authoritarian application of predictive technologies that is fundamentally incompatible with democratic governance and rule of law principles.

Southeast Asian countries, facing significant drug trafficking challenges related to the Golden Triangle region and emerging synthetic drug production, have pursued capacity-building partnerships with international organizations such as the United Nations Office on Drugs and Crime (UNODC). Indonesia has piloted AI and big data analytics for intelligence on trafficking routes, money laundering networks, and organized crime connections. Reported outcomes include improved intelligence products and enhanced inter-agency coordination, though implementation faces challenges including uneven technical infrastructure, capacity gaps in data science and analytics expertise, resource constraints, and governance questions about oversight and accountability (Ismail et al., 2025).

More advanced technological capacities are visible in Singapore, which has invested heavily in 'smart nation' initiatives including smart policing systems combining sensors, analytics, and command-and-control platforms. Japan and South Korea have pursued academic-agency collaborations to develop crime prediction models, generally with more transparent governance and public engagement than observed in authoritarian contexts. The diversity of approaches across Asia-Pacific illustrates how technological capabilities interact with political systems, legal frameworks, cultural values, and institutional capacities to produce vastly different implementations and outcomes. Table 2 summarizes illustrative implementations and key takeaways across jurisdictions.



Table 2. *Illustrative implementations and takeaways*

Jurisdiction	Tool/approach	Outcome/lesson
Los Angeles (US)	ETAS hotspot patrols	Improved capture of events; crime reduction per patrol hour (Mohler et al., 2015)
Chicago (US)	Person-based risk scoring (SSL/CVRM)	Decommissioned; data/oversight deficiencies; fairness concerns (Chicago OIG, 2020)
Los Angeles (US)	LASER/PredPol	Inconsistent implementation; mixed evidence; audit-driven reforms (LAPD OIG, 2019)
EU-level	Ports/market analytics	Heightened focus on organized crime and port security; strict rights protections (EMCDDA & Europol, 2024)
Indonesia	AI + big data pilots	Intelligence gains; capacity and governance hurdles (Ismail et al., 2025)

EVIDENCE OF EFFECTIVENESS: WHAT DO WE KNOW?

The evidence base for predictive policing effectiveness remains mixed and context-dependent. For spatio-temporal forecasting and near-repeat models, randomized controlled trial evidence shows that algorithmic predictions can improve targeting relative to analyst baselines, at least for certain property crime types. The Los Angeles ETAS trial (Mohler et al., 2015) provides the strongest evidence that directed patrols based on rigorous mathematical crime forecasts can capture more crime events and reduce crime per patrol hour. However, generalization of these findings to drug markets depends on several factors: whether drug offenses exhibit similar spatio-temporal clustering patterns as property crimes; the quality and completeness of drug offense data; operational implementation quality and compliance (dosage); and whether interventions beyond mere presence are applied when entering predicted hotspots. Some research suggests drug markets may show weaker near-repeat effects than burglary due to different offender decision-making processes and opportunity structures.

Person-based predictive tools have consistently struggled with construct validity (what exactly are we predicting?), data quality and drift (training data become outdated), fairness and legitimacy concerns (disproportionate impacts on marginalized groups), and lack of clear operational protocols (how should officers use risk scores?). External audits and inspector general reviews have documented these problems repeatedly, leading to recommendations for extreme caution or outright discontinuation (Chicago OIG, 2020; LAPD OIG, 2019). Research by Brayne (2020) shows that predictive risk scores can fundamentally alter police-community interactions, creating surveillance relationships that undermine trust and legitimacy even when crime reduction effects are unclear. The track record suggests that person-based tools should be approached with great skepticism, particularly in contexts where civil liberties protections and democratic oversight are priorities.

Intelligence-led strategies that combine network analysis with financial and logistical tracing show promise when adequately resourced and when inter-agency data sharing barriers are overcome. These approaches align with evidence-based principles of focusing on high-harm offenders and criminal enterprises, using multiple data sources to build comprehensive intelligence pictures, and applying interventions proportionate to threat levels (Perry et al., 2013; Caplan & Kennedy, 2016). However, such strategies require sustained investment in analytic capacity, human expertise to interpret complex net-



work data, legal frameworks enabling information sharing while protecting privacy, and coordinated multi-agency action.

Public health surveillance systems, exemplified by ODMAP, have demonstrated clearer and more consistent value. By enabling real-time sharing of overdose data across agencies and jurisdictions, these systems support actionable early warning for spikes that may indicate dangerous drug batches circulating in communities. When coupled with rapid public health responses—naloxone distribution, public alerts, outreach to at-risk populations, treatment access—overdose surveillance can reduce harm and save lives (Washington/Baltimore HIDTA, n.d.). The success of health-oriented applications suggests that predictive analytics may achieve better outcomes when framed as public health tools rather than purely enforcement tools, and when integrated into comprehensive harm reduction and treatment systems.

ETHICAL, LEGAL, AND SOCIAL CONSIDERATIONS

Bias and Disparate Impact

Algorithmic bias in predictive policing has become a central concern in scholarly analysis and public debate. The fundamental problem is that training data inevitably reflect historical enforcement and reporting patterns, which embed existing biases and structural inequalities (Lum & Isaac, 2016; Barocas & Selbst, 2016). If police have historically concentrated enforcement in predominantly minority neighborhoods—whether due to actual crime patterns, political pressure, resource allocation decisions, officer bias, or systemic racism—then predictive models trained on this data will learn to direct future enforcement to the same neighborhoods, perpetuating and potentially amplifying disparate impacts. This creates feedback loops where biased predictions generate biased enforcement, which produces new biased data confirming the original predictions. Mathematical analysis by Lum and Isaac (2016) demonstrates that even in the absence of explicit racial variables, proxies such as neighborhood characteristics can produce racially disparate predictions. The inherent trade-offs between different fairness metrics documented by Kleinberg et al. (2017) mean that optimizing one fairness criterion (e.g., equal false positive rates across groups) necessarily compromises others (e.g., equal false negative rates or overall accuracy). Agencies must therefore make explicit normative choices about which trade-offs they accept, based on stakeholder input and democratic accountability rather than purely technical optimization.

Transparency, Explainability, and Accountability

Opaque algorithmic systems that operate as ‘black boxes’ impede democratic oversight, legal accountability, and individual due process rights. When individuals or communities are subjected to enhanced enforcement based on algorithmic predictions they cannot understand or challenge, fundamental principles of transparency and procedural justice are violated. Agencies deploying predictive tools should therefore maintain comprehensive documentation including data lineage (where data come from, how they were processed), feature definitions (what variables the model uses and how they are measured), model cards describing system capabilities and limitations, validation protocols, and performance metrics disaggregated by demographic groups. Independent external audits should be enabled through appropriate data access while protecting individual privacy. Where stakes are high—particularly in person-based prediction—interpretable methods should be preferred over black-box



machine learning even if this involves some sacrifice of predictive accuracy, because explainability is essential for accountability.

Privacy and Data Protection

Predictive systems often integrate sensitive data including health information, location tracking, financial records, and communications metadata. Collection, storage, and use of such data must comply with strict legal frameworks—the General Data Protection Regulation (GDPR) in Europe, Health Insurance Portability and Accountability Act (HIPAA) in the United States for health data, and various national privacy laws. Key principles include purpose limitation (data collected for specific legitimate purposes), data minimization (collecting only necessary data), proportionality (balancing benefits against privacy intrusions), access controls (restricting who can view sensitive data), retention limits (deleting data when no longer needed), and individual rights (notice, access, correction, deletion). De-identification and aggregation should be default practices where possible. Person-based predictive scoring deserves heightened scrutiny because it creates permanent digital profiles that may follow individuals throughout their lives, potentially affecting employment, housing, and other opportunities beyond the criminal justice context.

Effectiveness and Proportionality

From both ethical and resource allocation perspectives, predictive tools should demonstrate meaningful outcome improvements relative to less intrusive alternatives before widespread deployment. Problem-oriented policing, community partnerships, situational crime prevention, and evidence-based treatment and prevention programs have established track records of effectiveness without requiring sophisticated predictive analytics or extensive data collection. When predictive tools are deployed, rigorous evaluation should establish whether they produce incremental benefits sufficient to justify their costs (financial, operational, privacy, legitimacy). Evidence thresholds for continuation should be defined in advance, and sunset or mandatory review clauses should prevent indefinite operation of systems whose effectiveness remains uncertain. This approach aligns with precautionary principles and proportionality doctrines embedded in human rights law.

Legal Frameworks: the EU AI Act

Regulation (EU) 2024/1689, commonly known as the EU AI Act, represents the world's first comprehensive legal framework for artificial intelligence. It introduces a tiered, risk-based regulatory regime. The Act explicitly prohibits certain AI applications deemed to present unacceptable risks to fundamental rights, including AI systems intended to predict whether individuals will commit criminal offenses based solely on profiling or assessment of personality traits. This prohibition directly targets person-based predictive policing applications. AI systems used in law enforcement are classified as high-risk, subjecting them to extensive obligations including ex-ante risk assessments, rigorous data governance ensuring quality and representativeness, technical documentation, logging of system operations for auditability, transparency requirements, mandatory human oversight, accuracy and robustness requirements, and registration in a public database. Non-compliance can result in substantial fines up to EUR 35 million or 7% of global annual turnover, whichever is higher (EUR-Lex, 2024). The EU AI Act thus codifies a rights-centric, precautionary approach to law enforcement AI, prioritizing fundamental rights protection and democratic oversight over technological solutionism.



PRACTICAL SAFEGUARDS AND OPERATING MODEL

Responsible deployment of predictive analytics requires multi-layered governance and operational safeguards. Governance structures should include AI oversight boards with diverse representation including community members, civil liberties advocates, data protection officers, technical experts, and ethicists—not solely law enforcement personnel. These boards should define use policies, establish red lines (prohibited uses), review high-risk deployments, investigate complaints, and recommend modifications or discontinuation when problems arise. Clear appeal and redress mechanisms should enable individuals and communities affected by predictive systems to challenge decisions and seek remedies.

Data stewardship practices should include comprehensive data inventories documenting all data sources and flows, explicit purpose specifications that limit use to defined legitimate aims, retention schedules that delete data when no longer needed, continuous monitoring for data quality degradation and concept drift, bias auditing to detect disparate impacts, and regular ethics reviews. Data protection officers should have authority to halt deployments that violate privacy or data protection standards. Model lifecycle management should encompass pre-deployment impact assessments examining foreseeable harms, baseline establishment and experimental or quasi-experimental evaluation designs (A/B testing, randomized controlled trials when feasible), continuous performance monitoring including calibration checks and error analysis, disaggregated reporting of performance by demographic subgroups, and periodic re-evaluation as contexts change.

Human-in-the-loop and human-on-the-loop architectures ensure that algorithmic outputs serve only as decision support rather than autonomous decision-making. Officers must receive training on system capabilities and limitations, cognitive biases in interpreting algorithmic outputs, and decision-making protocols. All deployment decisions influenced by predictions should be logged with justifications to enable accountability. Public health integration should establish formalized pathways from detection of drug activity or overdose risk to harm reduction services, treatment referrals, social support, and community intervention—moving beyond purely punitive responses. Transparency measures should include public documentation of system design and evaluation results (subject to appropriate security redactions), periodic independent audits with published findings, and publication of aggregate impact metrics and complaint statistics.

FUTURE DIRECTIONS

Future development of predictive analytics for drug crime should emphasize several priorities. Methodologically, advancing multi-modal fusion techniques that integrate text, signals intelligence, and financial data while maintaining interpretability; developing causal inference methods for rigorous policy evaluation beyond correlational prediction; and implementing privacy-preserving analytics using technologies such as secure enclaves, federated learning, and differential privacy. Real-time data ecosystems may incorporate Internet of Things (IoT) sensors, mobility analytics, and other novel data streams, but must do so under strict governance frameworks that prevent surveillance overreach and mission creep. Interoperable data standards and common ontologies can facilitate information sharing across agencies and jurisdictions while protecting privacy through appropriate access controls and purpose limitations.

Research priorities include conducting more randomized controlled trials and quasi-experimental studies specifically focused on drug markets and overdose outcomes rather than generalizing from property crime studies; investigating displacement and diffusion effects to understand whether interventions truly reduce crime or merely move it; examining long-term impacts on community trust,



police legitimacy, and health outcomes; and developing better metrics for algorithmic fairness that account for the inherent trade-offs identified by Kleinberg et al. (2017). Policy development should focus on harmonizing approaches to the EU AI Act's requirements, potentially extending similar principles globally; establishing export controls on law enforcement AI systems to prevent authoritarian misuse; developing standardized audit frameworks and certification schemes; and investing in capacity building, particularly in lower-resource jurisdictions, to ensure that technical capabilities are matched by governance capacity.

CONCLUSION

Predictive analytics can contribute meaningfully to drug crime prevention when deployed judiciously within robust governance frameworks that prioritize accountability, transparency, and human rights. Evidence demonstrates potential value for spatio-temporal targeting of enforcement resources and environmental risk mapping, particularly when coupled with situational prevention and community partnership strategies. Public health applications such as overdose early warning systems have shown consistent success in reducing harm when integrated with rapid response protocols and treatment access. However, experience also reveals significant pitfalls: person-based risk scoring has repeatedly failed to meet validity, fairness, and legitimacy standards; black-box systems impede accountability and reproduce biases; and feedback loops can amplify structural inequalities rather than ameliorate them.

The fundamental lesson is that technology alone cannot solve complex social problems like drug markets, addiction, and associated crime. Predictive tools should complement, not replace, comprehensive strategies that address root causes: poverty, inequality, lack of treatment access, untreated mental illness, community disinvestment, and systemic discrimination. Enforcement-oriented prediction must be balanced with health-oriented intervention and prevention-focused resource allocation. The EU AI Act's prohibition of certain predictive policing applications and strict regulation of high-risk AI systems reflects a policy judgment that fundamental rights protection and democratic oversight must take precedence over potential efficiency gains from unconstrained algorithmic prediction.

Moving forward, agencies considering predictive analytics for drug crime should: demand rigorous evidence of effectiveness through experimental evaluation; establish governance structures with community representation and independent oversight; implement comprehensive bias auditing and fairness monitoring; prioritize transparency and explainability; integrate enforcement tools with public health and social service responses; and maintain proportionality by ensuring that privacy intrusions and civil liberties restrictions are justified by demonstrated benefits. Research must continue to develop methods that are both technically sophisticated and ethically sound, recognizing inherent limitations and trade-offs rather than promising technological silver bullets. With appropriate safeguards and realistic expectations, predictive analytics can serve as one component—but only one component—of evidence-based, health-integrated, and rights-respecting approaches to the complex challenge of drug-related crime.

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SPECIAL TECHNICAL KNOWLEDGE IN THE FIELD OF DIGITAL CURRENCY AND MINING NECESSARY FOR LAW ENFORCEMENT OFFICERS

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ABSTRACT

Purpose: This paper discusses the question of what special technical knowledge in the field of digital currency and mining is necessary to solve and investigate crimes committed using information and communication technologies. The examples highlight the special role of fundamental training in mastering advanced technologies, as well as the advisability of including relevant topics in the educational process of law enforcement educational institutions.

Design/Methods/Approach: For new technologies, the degree of usefulness is almost impossible to assess: since the technology is new, there is no experience in its application. It turns out that the so-called Lindy effect is observed: the longer a technology exists, the more likely it is to continue to exist. The Lindy effect leads to a paradoxical conclusion: in order to be successful in information and communication technologies, one should not chase after “fashionable novelties”, but study the fundamental patterns underlying a large class of such novelties at once.

Findings: Modern information technologies, including those related to cryptocurrency, are based on fundamental knowledge in the field of mathematics (number theory, graph theory, cryptography) and electrical engineering.

Originality/Value: Thus, modern trends in the development of information technologies and their penetration directly into the sphere of legal regulation of public relations at the level of laws require improving the training of lawyers and law enforcement officers.

With regard to technologies related to digital currency and blockchain, it is necessary to focus on a combination of fundamental training and the usefulness of the teaching materials for students.

Keywords: special knowledge, digital currency, cryptocurrency, mining, crime investigation, information technology.

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PURPOSE

Crimes committed using information and communication technologies remain one of the most widespread and rapidly growing categories of crime. Among other trends, there is a rise in AI-driven cyberattacks (deepfake scams, automated phishing) the incidence of which has increased by 300% since 2021 (Giboney et al., 2023). Only 17% of cybercriminals face legal consequences due to jurisdictional issues (Ashurov, 2024). Thus, the detection rate of crimes committed using information and communication technologies remains low. It can be stated that their public danger continues to increase.

One of the most modern information and communication technologies used to commit crimes is cryptocurrency. The use of cryptocurrencies in organizing criminal activity significantly increases the degree of conspiracy of criminals, for example, in the field of illegal drug trafficking. However, in recent years, the use of cryptocurrencies and the underlying blockchain technology has gone beyond the limits of exclusively criminal activity in this area.

Modern society is characterized by the intensive development of information technologies and the growth of their influence on people's lives. At the initial stage, information technologies were only a means of automating familiar activities, so they did not require special legislative regulation. However, over time, the development of science and technology has led to the creation of prerequisites for the formation of such social relations that run counter to conventional ideas, and attempts to regulate them legally without taking into account the specifics of their functioning encounter serious problems.

One of these information technologies is the so-called cryptocurrency – a phenomenon at the intersection of economics and computer technology, which has recently attracted significant public attention. Cryptocurrency is an information system for exchanging property in electronic form and, at the same time, a unit of measurement of the amount of this property. This article discusses the principles of functioning of cryptocurrencies and the influence of these principles on the possibility of applying the concept of property rights to cryptocurrency.

Today, cryptocurrency is not only used to commit crimes as a means of increasing secrecy, but has itself become an object of criminal attacks. Cryptocurrency mining, in turn, is often committed in violation of the law: theft of electricity, distribution of malware, non-payment of taxes from the sale of cryptocurrency.

Thus, cryptography, blockchain technology and cryptocurrencies are becoming objects of consideration of civil, tax, administrative, criminal and even constitutional law.

An effective fight against offenses in all of these areas is impossible without at least a superficial understanding of the principles of operation of the relevant information and communication technologies. For example, determining the most appropriate legal mechanism for ensuring the safety of cryptocurrency during a criminal investigation is based on an understanding of what makes it possible to manage an account in cryptocurrency. This thesis is confirmed by the penetration of references to specific technologies into the texts of laws. For example, Federal Law “On the Basic Guarantees of Electoral Rights and the Right to Participate in a Referendum of Citizens of the Russian Federation” includes the term “chain of blocks” (i.e. blockchain technology) and encryption and decryption keys (i.e. asymmetric cryptography).

In addition, in civil law, in connection with the introduction of the concept of “digital rights”, the construction “in accordance with the rules of the information system” appeared. Before our eyes, the concept of “proof” in mathematics and jurisprudence is merging.



Thus, in some areas fundamental to the functioning of the state, information and communication technologies are no longer a “black box” for jurisprudence, the details of which can be left to technical specialists.

One of the barriers that complicate the understanding of modern information and communication technologies by specialists in other subject areas (including jurisprudence) is their very dynamic development and the constant emergence of new technologies. It is simply impossible for one person to keep up with them all. Today, there are no specialists in information and communication technologies at all; this sphere is fragmented into areas that are increasingly isolated from each other. All this leads to the need for each person to choose which specific information and communication technologies to master.

This paper discusses the question of what special technical knowledge in the field of digital currency and mining is necessary to solve and investigate crimes committed using information and communication technologies from conceptual and theoretical perspectives.

DESIGN/METHODS/APPROACH

One of the considerations that allow choosing which information technologies to master is studying those information technologies whose benefits for professional activity are immediately obvious. However, for new technologies, the degree of usefulness is almost impossible to assess: since the technology is new, there is no experience in its application. But with this approach, a person acts reactively: he passively reacts to what is happening. With this approach, law enforcement agencies will be in a catch-up position in mastering information and communication technologies compared to criminals. In order to be prepared for the emergence of new information and communication technologies that can be used to commit crimes, a proactive approach is required.

It turns out that the so-called Lindy effect is observed: the longer a technology exists, the more likely it is to continue to exist. Thus, this effect statistically predicts that the longer a period something has survived to exist or be used in the present, the longer its remaining life expectancy. Longevity implies a resistance to change, obsolescence, or competition, and greater odds of continued existence into the future. In other words, the probability of disappearance of a certain technology decreases with time. That is, the logic of the life cycle of living beings, in which mortality increases with age, does not apply to them. (Taleb, 2021: 318)

The Lindy effect leads to a paradoxical conclusion: in order to be successful in information and communication technologies, one should not chase after “fashionable novelties”, but study the fundamental patterns underlying a large class of such novelties at once.

This statement should not imply it is pointless to study new technologies at all. The point is in the choice of focus: what should a specialist focus on studying? New technologies can and even should be studied. After all, even technologies that are today believed to have been tested by time were once new. But at the same time, one must always keep in mind that something new can lose popularity as quickly as it attracted attention when it appeared. In reality, it is worth concentrating on technologies and knowledge that have existed for a long time.

Let us consider the key technologies that underlie the functioning of cryptocurrencies and are used to detect and solve cryptocurrency-related crimes, and try to trace the effect of the Lindy effect on them.



FINDINGS

The first cryptocurrency was Bitcoin; the name comes from the English words *bit* (the smallest unit of information in computing) and *coin*. An article describing this system was published in 2008 by a person or group of people under the pseudonym Satoshi Nakamoto (Nakamoto, 2008).

Bitcoin was created as a decentralized alternative to traditional electronic payment systems with centralized accounting, based, in essence, on the trust of participants in the organizer of the system (the state or a legal entity).

The exchange of property in electronic form requires maintaining a database that stores information on the status of accounts and transactions, as well as an authorization system – checking the right to dispose of accounts (implement transactions). In traditional electronic payment systems, this database and authorization system are managed by a trusted person – the organizer of this electronic payment system, who ensures the correct functioning.

If you refuse to have a trusted person, then a set of questions arises, without answers to which the functioning of such a system is impossible:

- How to check the right to dispose of property on the account?
- Where should the database of accounts and transactions be stored?
- How to ensure that transactions cannot be canceled after their completion?

Confirmation of the right to manage an account is carried out using asymmetric cryptography, namely, electronic signature technology. Creating an account in a cryptocurrency consists of randomly choosing a password and constructing an account number based on this password. The account number is open information and plays the role of the electronic signature verification key, and the password must be kept secret, since it is used to affix an electronic signature.

To transfer funds from one account to another, the owner simply signs (using specialized software) the corresponding order with his electronic signature and sends it to all participants in the system. At the current level of development of science and technology, there is no method for counterfeiting an electronic signature in a reasonable time, while anyone can verify that the order was actually signed by the account owner.

In cryptocurrencies, the current state of accounts, as a rule, is not stored at all, but is determined by the history of transactions. At the same time, the transaction database must be stored by all interested participants in the system. This, in turn, requires solving the problem of database consistency among different participants and its special case – the impossibility of canceling a transaction after it has been completed.

To confirm the right to manage a cryptocurrency wallet, an electronic signature is used, which in turn is based on asymmetric cryptography, and hash functions are used to link blocks in the blockchain without significantly increasing their volume.

Both asymmetric cryptography and hash functions are used not only in digital currencies (Rogaway & Shrimpton, 2004). Hash functions are operations that convert data (transaction details in the context of cryptocurrency) into fixed-length number. The key property of a good hash functions is that even a tiny change in the input produces a totally different hash output. In cryptocurrency, each block of transactions includes a hash of the previous block.

This is the essence of blockchain technology. The goal of mining is to manipulate the order of transactions and add random data to form a block so that its hash starts with a certain number of zeros, which is determined by the combined computing power of all miners. For hash functions used in cryptography and cryptocurrencies, this problem, according to modern concepts, can only be solved



by brute force. In addition, if a malicious participant attempts to alter one transaction, they would have to modify all subsequent blocks. That process requires as much resources as initial mining, therefore it is not practical.

Asymmetric cryptography is very widely used today due to the fact that it allows you to organize a secure channel for transmitting information over an unprotected one, for example, over the Internet. Therefore, it is used for authorization and data transfer by online banks, social networks and, in general, any sites that provide for the exchange of confidential information with users. This is possible because asymmetric cryptography uses two keys: a public key for encryption and a private key for decryption. There is no effective algorithm for recovering the private key from the public key. Therefore, the public key can be published or transmitted over an insecure communication channel.

Asymmetric cryptography is based on the achievements of number theory, which were obtained in the 17th and 18th centuries: Fermat's little theorem and Euler's theorem (Stallings, 2017). In turn, the roots of number theory can be easily traced back to the Common Era, for example the concept of a prime number (Dunham, 2018). All the mentioned results in complexity do not go beyond the school mathematics curriculum. A specific type of asymmetric cryptography used in the Bitcoin cryptocurrency is based on the use of so-called elliptic curves. The corresponding cryptographic methods were proposed in 1985 (Koblitz & Miller, 1985), while the study of elliptic curves was actively conducted in the 19th century (Weierstrass, 1863/2015), some results used in elliptic cryptography belong to Newton (Silverman, 2009: 45–50), and the first known consideration of such curves is given in Diophantus's Arithmetic, written in the 3rd century AD (Goldfeld, 1985: 25).

Of course, the development of the first cryptocurrency (Bitcoin) is a brilliant achievement, and its creator or creators were geniuses in several fields at once. But in order to understand the principles of cryptocurrency functioning, there is no need to be such a genius: there are complete descriptions of Bitcoin functioning intended for schoolchildren.

Despite the very recent emergence of cryptocurrencies (2009 – the emergence of Bitcoin, mass popularity among the general population – 2017), their principles are based on fundamental results that appeared long before the 21st century and are widely presented in the literature. Thus, the role of fundamental knowledge for information and communication technologies is confirmed by the example of cryptocurrencies.

When investigating such crimes, knowledge of electrical engineering becomes relevant for law enforcement officers. For example, the amount of stolen electrical energy can be estimated by the amount of cryptocurrency obtained through mining. A quick search of legal scientific literature reveals several publications in which “kilowatt per hour” or “kW/h” is mistakenly indicated as the unit of measurement for the volume of consumed or produced electrical energy. In reality, a kilowatt is a unit of power, i.e. energy consumption per unit of time. Accordingly, the unit of measurement for electrical energy can be “kilowatt hour”, similar to such a unit of measurement for working time as “person-year”.

Naturally, some familiarity with electrical engineering and physics would help to avoid such annoying mistakes. In the case of scientific publications, their immediate harm is not great, but in the case of legally significant documents, the situation can be worse: from damage to the reputation of government agencies to invalidation of investigative protocols. Let us emphasize that here again we are talking about a fundamental fact that does not depend on new models of mining equipment. Investigation of crimes committed using cryptocurrency or encroaching on cryptocurrency accounts is extremely difficult due to the anonymity of wallets. However, the exchange of cryptocurrency for material assets (which is the ultimate goal of most crimes in this area) mainly takes place through exchange sites or



stock exchanges, since it is quite difficult to find a counterparty who would agree to accept cryptocurrency as payment.

This means that the issue of determining the identity of the owner of a cryptocurrency wallet comes down to tracking the chain of transactions leading to the wallet on the exchange or exchanger. Cryptocurrency accounting is decentralized and information about all cryptocurrency transactions is available in open sources, such as exchange websites. However, manual tracking of transaction chains in real conditions is time-consuming and error-prone. Blockchain analysis systems have been developed to automate such actions.

Such systems, as a rule, represent web services from the end user's point of view, functioning on the basis of multiprocessor servers. Designing such hardware and software complexes is a separate engineering task. To model the performance of such complexes, the apparatus of queuing theory is used, and for optimization, evolutionary methods of global optimization are used (Galushin, Serikova, Terskov & Yarkov, 2020).

One of the foundations of blockchain analysis systems is graph theory: a section of mathematics that studies the structure of connections between objects of arbitrary nature. In the case of blockchain analysis, the objects are cryptocurrency wallets, and the connections are transfers between wallets.

The origins of graph theory go back to antiquity: the philosopher and mathematician Porphyry of Tyre used the image of a tree as an illustration of the dichotomous division in his work "Introduction" to classify the philosophical concept of matter (Barnes, 2003), and a tree can be considered one of the varieties of graphs. The real scientific study of graphs began when Leonard Euler, in his article published by the St. Petersburg Academy of Sciences on the solution of the famous problem of the Königsberg bridges, dated 1736, was the first to apply the ideas of graph theory in proving certain statements (Hopkins & Wilson, 2004). In the 19th century, graph theory was used in electrical engineering and organic chemistry (Biggs, Lloyd & Wilson, 1986).

Today, this mathematical theory is very actively used in practice, since graphs can be used to describe computer and social networks. Such a direction as "social network analysis" can be largely characterized as applied graph theory. Social network analysis can be used in the disclosure and investigation of crimes, since it allows you to extract information stored on the Internet in an implicit form. From the above, it is clear that the basis of blockchain analysis, which appeared relatively recently and is necessary for the disclosure and investigation of crimes committed using cryptocurrencies, is graph theory, which appeared in the 18th century and was finally formed in the middle of the 20th century. At the same time, this scientific direction had law enforcement applications before the advent of cryptocurrencies. Specialists who have studied elements of graph theory for use in the analysis of social networks have received a certain advantage in the study of blockchain analysis.

We again see that fundamental facts established long before the advent of computers are useful in terms of studying the most modern information and communication technologies.

One of the common types of crimes related to cryptocurrency in recent years has been the theft of electricity for mining. The fact is that for mature cryptocurrencies, mining requires a large amount of computing resources, and therefore – electricity costs.

The question of qualifying such an act as an administrative offense or a crime depends on the amount of stolen electricity. Let's consider how electricity consumption can be related to income from mining.

As an example, let us consider Bitcoin, since this cryptocurrency is historically the first, has had and continues to have an impact on most other cryptocurrencies and still has the highest capitalization.



The costs of cryptocurrency mining can be considered from three aspects: the cost of computing resources, the cost of electricity and the cost of money. The cost of computing resources is measured in terahashes (billions of calculations of the hash function values of the cryptocurrency, hereinafter also – Th). The performance of mining equipment is called hashrate, accordingly, it is measured in terahashes per second (hereinafter also – Th/s).

Electricity costs are measured in kilowatt-hours (kWh) and depend on computing costs, performance, and power consumption of the equipment. Costs in monetary terms depend on electricity costs and the price of electricity, excluding capital costs in the form of purchasing equipment and premises for mining.

Ultimately, the profitability of mining and the damage from illegal mining are determined by a number of factors that have a significantly different nature: from fundamental physical laws to tariff regulation policies in a particular region.

All values are indicated with significant rounding, since the Bitcoin network hashrate and, as a consequence, all other values are subject to fluctuations. The order of the numbers is of interest. In addition, manufacturers are constantly releasing new models of mining equipment, which also affects the values of the indicators. The income of a Bitcoin cryptocurrency miner consists of two parts: the release of a new cryptocurrency and the commission of all transactions included in the block. At the moment, the commission is many times inferior to the release of a new cryptocurrency. Therefore, we will also ignore the presence of a commission.

We will proceed from the total hashrate of the Bitcoin network. The exact value of this value is unknown, but it can be estimated based on the complexity of the block and the number of blocks “mined” per unit of time. According to blockchain.com, this value is growing quite steadily and is currently estimated at approximately 680 million TH/s.

The Bitcoin network adjusts the mining difficulty so that a new block is formed on average every 10 minutes (Antonopoulos, 2017). Multiplying the average block formation time by the hashrate, we get the required number of calculations to form one block: 408 billion terahashes.

Today, the miner’s reward for a block is 3.125 bitcoins. Dividing the required number of calculations to form one block by the miner’s reward for a block, we get 130,560,000,000 terahashes per 1 bitcoin.

Let us determine the period in which such a number of calculations can be performed on modern equipment. Let us take for evaluation the ASIC Bitmain Antminer S21 Pro, released in July 2024. Its hashrate is 234 TH/s, so to “mine” 1 bitcoin it will need about 560 (or 155 thousand hours, about 6500 days). Considering that the power consumption of such a device is 3510 W, about 540 thousand kW-hours will be spent on “mining” 1 bitcoin. Calculations for other ASICs give comparable results.

The EU average electricity price for households, including taxes and levies is 0.29 euro per kWh or about 0.3 US dollars (Eurostat, 2023). That is, mining one bitcoin will cost about 160 thousand US dollars. The market price of one bitcoin is about 100 thousand dollars at the moment of writing of this article.

The calculations given can be used as a basis for the methodology for conducting an economic examination when considering cases related to violation of mining rules.

Furthermore, these considerations show that investigating crimes committed using cryptocurrency requires knowledge from various fields, including such different ones as law and electrical engineering.



ORIGINALITY/VALUE

Thus, in the context of active counteraction to the detection and investigation of crimes by criminal groups engaged in the illegal distribution of drugs via the Internet, law enforcement officers should constantly improve their professional level in the field of Internet technologies and telecommunications.

In higher education institutions of law enforcement agencies, it seems appropriate to teach the topics in such an order as to move from the general to the specific. For example, in the first year, within the framework of the discipline “Computer Science and Information Technology in Professional Activity”, theoretical foundations are studied and practical skills are acquired as both necessary for solving and investigating crimes, and applicable in other aspects of professional activity, including studying other disciplines of specialization.

Then, within the framework of the course “Fundamentals of Cybersecurity”, students will learn how the general principles of computer science and information technology can be applied to preserve state secrets, ensure anonymity and security when working on the Internet and solving other official tasks. In addition, here, when studying cryptography, the principles of functioning of cryptocurrencies can be studied. This occurs after or in parallel with the study of disciplines considering the humanitarian and legal aspects of these issues, for example, “Secrecy Regime”. Finally, in the senior years, a special course is taught by several departments (crime investigation, forensics and criminal procedure), which synthesizes the knowledge, skills and abilities studied in various disciplines and practical training in territorial bodies for the purpose of solving and investigating cybercrimes in accordance with the current needs of law enforcement agencies and trends in the methods of committing crimes.

The described approach allows, on the one hand, to build the educational process in such a way that in the junior years, knowledge and skills are acquired that, due to their fundamental nature, will not become obsolete by the time of graduation (and for information technology, even 4 years of a bachelor’s degree is a very long time), and in the senior years – knowledge and skills that are directly in demand in practical activities, but tend to quickly become obsolete (for example, specific methods of committing crimes and organizing criminal activity, certain software used by attackers, etc.). Due to the very dynamic development of information technologies and the constant adaptation of criminal activity, the professional development of an employee cannot end after graduation. Higher education must be supplemented by regular advanced training.

With regard to information and communication technologies related to digital currency and blockchain technologies, it is necessary to focus on a combination of fundamental training and the usefulness of the taught material for professional service activities.

Despite the very recent emergence of cryptocurrencies, their principles are based on fundamental results that appeared long before the 21st century and are widely presented in the literature. Thus, the role of fundamental knowledge for information technology is confirmed by the example of cryptocurrencies.

The development of the first cryptocurrency (Bitcoin) is a brilliant achievement, and its creator or creators are geniuses in several fields at once. Yet in order to understand the principles of cryptocurrency, there is no need to be as brilliant: there are complete descriptions of Bitcoin, intended for schoolchildren.

In addition, cryptocurrency and related technologies, due to their novelty and attractiveness, can become a good motivation for studying the field of cryptography in general. The next step is to overcome the prejudice about the boringness of mathematics. Indeed, few people can be interested in mechanical calculations, but they have a very indirect relation to the essence of mathematics and do not attract even mathematicians themselves. At the same time, the author’s experience shows that the discussion



of, for example, “illegal prime number” arouses interest and lively discussion among students of legal specialties. On this basis, one can develop interest in number theory.

Modern trends in the development of information technologies and their penetration directly into the sphere of legal regulation of public relations at the level of laws require improving the training of lawyers and law enforcement officers.

With regard to technologies related to digital currency and blockchain, it is necessary to focus on a combination of fundamental training and the usefulness of the taught material for students.

The introduction of all concepts should be motivated, using examples from jurisprudence and the practice of combating crime. The facts and results presented by the teacher should be applicable both to subsequent topics and in the professional activities of students.

However, such an approach to teaching puts forward very high demands on the authority of the teacher, which should be based not only on discipline and coercion to submission due to subordination, but also on a high level of qualification of the teacher. Ideally, a modern teacher should combine deep knowledge of information technology and practical experience in law enforcement agencies.

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CIRCUMSTANCES TO BE PROVEN IN CRIMES COMMITTED THROUGH THE USE OF INFORMATION TECHNOLOGIES

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ABSTRACT

Purpose: This article aims to explore the key legal and technical issues in proving crimes committed using information technologies, analyze the system of facts to be proven in such crimes, and propose effective approaches to address current challenges.

Design/Methods/Approach: Using the comparative legal method, the article analyzes the legislation of the Republic of Azerbaijan alongside international norms and best practices. The legal status of digital evidence and its role in the investigation process are examined. Practical court decisions are also reviewed to assess the current situation.

Findings: Research shows that normative-legal mechanisms for collecting and analyzing digital evidence are still under development. The findings suggest a need for new approaches to ensure the reliability and legality of information technology-related evidence submitted to courts in such crimes.

Originality/Value: The novelty of the research lies in the author's presentation of a unified conceptual approach to the system of facts to be proven in crimes committed using information technologies. The author also offers practical proposals for improving national legislation in this field, creating real application opportunities for law enforcement agencies and courts.

Keywords: digital evidence, information technologies, cybercrime, proving, investigation.

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INTRODUCTION

In the modern era of accelerated globalization, one of the most characteristic trends is the process of digitalization, which almost entirely encompasses our lives through the active application of modern information and telecommunication technologies, as well as digital devices and tools. This includes the development and expansion of artificial intelligence engineering, biometric identification, "cloud" services, cognitive technologies, online banking, and other services, among others. The Okinawa Charter on the Global Information Society, adopted on June 22, 2000, explicitly emphasizes that information and communication technologies are among the most significant factors shaping society in the 21st century. These technologies have a revolutionary impact on people's lifestyles, their education

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and work, as well as on the interactive cooperation between governments and civil society [20, pp. 51–56; 21, p. 3].

Modern civilization has entered the era of global digitalization, a period characterized by the fundamental transformation of all spheres of human activity. People use the internet on a daily basis, communicate through social networks, establish connections, and pay for many services and goods using digital means. At the same time, alongside all the positive and progressive aspects of digital technologies, it should be noted that they also serve as a source of certain threats and risks [115, p. 26].

According to international research, in 2024 cybercrime reached an extremely dangerous scale, with the global damage caused by this type of crime amounting to 9.5 trillion USD. Experts predict that the financial losses resulting from cybercrime will continue to grow exponentially, following a geometric progression. Research by the International Monetary Fund (IMF) forecasts that by 2027 the damage inflicted by cybercrime worldwide will reach 23 trillion USD. These figures surpass the damages caused by natural disasters and indicate that cybercrime is becoming a more profitable form of criminal activity than global drug trafficking [9;10;11].

It is rightly noted that the use of high technologies for criminal purposes has led to serious challenges for law worldwide, including substantive, procedural, and international law. As in other countries, in Azerbaijan as well, certain criminal-law aspects of the use of artificial intelligence and the most modern digital technologies are not adequately regulated in legislation, while gaps remain in the criminal-procedural framework [30, p. 65].

Judicial-investigative practice and official statistical data show that, starting from the second decade of the 21st century, there has been a significant increase in crimes committed through the use of information and telecommunication technologies. Such growth is particularly observed in crimes against property and in the illicit circulation of narcotic drugs and psychotropic substances committed by means of these technologies. The use of information technologies in the commission of crimes often eliminates direct contact between the offender and the victim, which in turn complicates the process of identifying the perpetrator [27, p. 126].

In recent years, among the more widespread types of cybercrimes, particular mention should be made of cyber fraud, extortion through the use of cyber means, cyber espionage, cyber theft, online drug trafficking, cyberterrorism and cyber extremism, cyberbullying, and others [29, p. 8]. R. Sh. Mahmudov rightly points out that “criminal elements actively make use of the internet’s opportunities; terrorist organizations conduct the advertising and sale of narcotics and weapons, pornographic materials are disseminated, and racist, nationalist, and extremist-oriented websites are widely spread across the global network. The high social danger of crimes in this virtual space is of a transnational nature. In other words, the consequences of such activities affect large groups of people and various countries” [6, pp. 59–60].

The analysis of the practice of law enforcement agencies of the Republic of Azerbaijan, particularly the preliminary investigative bodies, shows that in recent years information technologies have been increasingly used for the commission of crimes related to the illicit trafficking of narcotic drugs and psychotropic substances (advertising, promotion, and sale of narcotics). It can be stated that cyberspace has become one of the most difficult and complex links in the chain of detecting crimes connected with the illegal circulation of narcotic drugs and psychotropic substances. This is because it is extremely challenging to identify and bring to justice the individuals who commit such criminal acts through contactless methods.

According to official statistics, in the Republic of Azerbaijan, 2,558 crimes were registered in 2023 and 2,057 crimes in 2024 by the Ministry of Internal Affairs and the Prosecutor’s Office through the use



of information technologies. Of these, 1,027 crimes were solved in 2023, and 1,129 crimes remained unsolved in 2024. Thus, the detection rate amounted to 49.8% in 2023 and 51.8% in 2024.

In January–June 2025, a total of 1,046 crimes committed using information technologies were registered across the republic, of which 549 were solved and 321 remained unsolved. The detection rate amounted to 65.0%.

Each type of crime has its own specific characteristics and therefore requires a particular approach to a complex of criminalistic and procedural matters, including the detection and investigation of the crime, determination of the circumstances to be proven, identification and recording of digital traces, collection and analysis of digital evidence, and the organization and conduct of individual investigative actions – particularly urgent investigative measures – and digital forensic examinations.

The primary characteristic that defines a particular legal violation as a cybercrime is that it is committed through the use of computers, network technologies, digital technical devices and tools, or malicious software [12, p. 7; 13, p. 81].

The relevance of this research lies in examining the distinctive features of evidence in crimes committed through information technologies, which differ significantly from traditional forms of legal violations. The digital nature of traces of criminal activity, their volatility, the risk of loss or destruction, and the high probability of alteration present fundamentally new challenges to investigative and judicial bodies worldwide, particularly to courts. For this reason, studying the problems that arise in the process of proving crimes committed through the use of information technologies during detection and investigation is of great significance.

RESEARCH

Crimes committed through the use of information technologies represent a qualitatively new type of unlawful activity, characterized by a number of specific features that significantly affect the process of proving them. In accordance with international conventions, these crimes are socially dangerous acts committed through the use of information technologies, information systems, and information and telecommunication networks.

As is known, on December 24, 2024, the United Nations adopted a new, more comprehensive, and unified Convention against Cybercrime.

The Convention covers a broad scope, including combating crimes committed through information and communication technology systems and strengthening international cooperation for the exchange of electronic evidence in serious crimes.

The positive aspects of the new Convention can be highlighted as follows:

International cooperation – the Convention facilitates joint work of law enforcement agencies by strengthening relations between countries in the fight against cybercrime; legislative harmonization – the Convention is aimed at unifying the national legislations of the participating states, which allows the development of common approaches to countering cybercrimes; effective information exchange – the Convention establishes a framework for the exchange of electronic evidence in relation to serious cybercrimes, thereby simplifying and accelerating the investigation of these categories of crimes; unified standards – the Convention helps in the development of uniform criminal-law policies and standards for combating cybercrime.



At the same time, the ratification and entry into force of the Convention may create challenges arising from the existing diversity in national legal systems and technical infrastructures of the states. Furthermore, the expansion of powers in the exchange of electronic information and obtaining electronic data may give rise to issues related to confidentiality and the protection of privacy. Another factor that could complicate the ratification and implementation of the universal treaty is that countries may have differing perspectives and approaches regarding cybersecurity, sovereignty, and information freedom.

The UN Convention against Cybercrime (Article 2) provides definitions for a number of terms, including “information and communication system,” “electronic data,” “traffic data,” “content data,” “personal data,” and others, clarifying their essence and meaning. For example, according to paragraph (b) of Article 2 of the Convention, “electronic data” means the representation of facts, information, or concepts in a form suitable for processing by an information and communication system. Electronic data also include a program that enables the information and communication system to perform a particular function as a result of operations or commands.

Chapter 2 of the Convention is titled “Criminalization”, and it emphasizes the obligation of the participating states to classify the following acts as criminal offenses under their national legislation: Illegal access to an information and communication system or any part thereof with the intent to obtain electronic data (Article 7); Illegal interception of electronic data (Article 8);

Intentional and unlawful damage, deletion, deterioration, alteration, or blocking of electronic data (Article 9); intentional and unlawful interference with the functioning of an information and communication system by inputting, transmitting, damaging, deleting, deteriorating, altering, or blocking electronic data, causing serious disruption (Article 10); intentional and unlawful use of devices, including software specifically designed or adapted for committing any offense, for obtaining, producing, selling, procuring for use, disseminating, or otherwise making available passwords, access codes, electronic signatures, or analogous data that allow unauthorized access to any information and communication system or part thereof (Article 11); intentional and unlawful input, alteration, deletion, or blocking of electronic data, leading to the creation of non-authentic data and intended to be considered authentic for legal purposes (Article 12); computer-related fraud or theft using an information and communication system (Article 13); distribution of material online involving sexual abuse or exploitation of children (Article 14); deceptive or trust-inducing conduct aimed at committing sexual offenses against children (Article 15); distribution of intimate images of a person without their consent (Article 16); money laundering, i.e., the legalization of proceeds obtained from criminal activity (Article 17).

As can be seen, compared to the Budapest Convention of 2001, the Convention against Cybercrime adopted in 2024 has significantly expanded the range of acts that must be criminalized.

The characteristics of traces of criminal activity in the digital environment fundamentally distinguish cybercrimes from traditional forms of criminal behavior. Digital traces are characterized by high variability, the potential for rapid destruction or modification, and the ability to be automatically replicated and disseminated. Unlike physical traces, digital traces can simultaneously exist across various technical devices and geographic locations [18, p. 114].

Currently, behind the organization and commission of crimes carried out through the use of computer technologies, electronic information carriers, and information and telecommunication networks, including the internet, are primarily transnational organized groups and criminal organizations specializing in the illegal circulation of narcotics, extremist and terrorist activities, and the commission of crimes against property through the use of these technologies and networks [16, p. 3].



The Internet also provides new opportunities that facilitate the commission of various crimes against property, public safety, morality, and other interests. Among these, the following can be highlighted:

1. Anonymity – the Internet allows criminals to commit unlawful acts while maintaining their anonymity. Offenders use networks such as Tor and VPNs, fake accounts, and stolen identifiers to conceal their identity and ensure anonymity, which complicates their detection and the prosecution of those responsible.
2. Global reach – the Internet has no geographic boundaries, enabling criminals to carry out illegal activities from anywhere in the world.
3. Technical complexity – many cybercrimes require specialized technical knowledge for their detection and investigation.
4. Scale – the extremely large number of users and transactions online significantly complicates monitoring of illicit activities and detecting criminal conduct.
5. Accessibility of the object of criminal intent – the location of the intended target is practically irrelevant for committing the act; the availability of favorable conditions for preparation and execution of the crime means that planning and committing offenses can be done from virtually any computer with internet access.
6. Systematic latency (hyper-latency) – another feature of cybercrime is its hidden nature. It is practically impossible to determine the real scale of cybercrime or measure it quantitatively.
7. Transnational nature of cybercrimes – the cross-border character of these offenses creates additional challenges in the process of proving them. For example, the perpetrator may be in one country, the servers used in another, and the victims in a third country.

This, in turn, dictates the necessity of international cooperation but creates jurisdictional challenges when collecting and securing digital evidence.

8. Incomplete development of laws and other normative-legal acts – in many countries, existing legislation does not allow for effective counteraction against new types and forms of cybercrimes, primarily because cybercrimes are in a constant state of evolution and change. As a result, many perpetrators of these acts can evade criminal liability and remain unpunished.
9. Underestimation of risks – many Internet users fail to properly assess cybersecurity risks and do not take the necessary measures for cyber protection. This ultimately makes them easy targets for criminals [14, p. 11–12; 29, p. 11].

Taken together, these attributive features and characteristics provide a clear understanding that combating crimes committed through the use of information and communication technologies must be carried out comprehensively with the support of criminal law, criminological, criminalistic, and procedural tools. They also highlight the necessity of fundamentally revising scientific and practical approaches to identifying the problem and determining ways to address it [21, p. 10–11].

As noted earlier, the development of information technologies and their penetration into all spheres of public life significantly affect the nature of modern criminality. Economic and financial crimes, as well as offenses against property, public safety, morality, and other interests, are increasingly being committed through the use of various high-tech means. This substantially complicates their detection and the process of proving them. Under these circumstances, the identification, seizure, examination, and evaluation of digital evidence and other electronic information – such as electronic documents, digitally significant criminal data, and transaction-related information – becomes particularly important during the investigation of crimes committed through the use of information technologies [17, p. 38].



It should be noted that the Criminal Code of the Republic of Azerbaijan (CC RA) includes provisions on liability for cybercrimes in Chapter 30, titled “Cybercrimes.” This chapter establishes criminal liability for acts such as unauthorized access to a computer system (Article 271), illegal acquisition of computer data (Article 272), unauthorized interference with a computer system or computer data (Article 273), circulation of tools prepared for committing cybercrimes (Article 273-1), and falsification of computer data (Article 273-2) [3, p. 40].

The use of Internet information resources, information and telecommunication networks, electronic data carriers, or information technologies in the commission of a crime is recognized as an aggravating factor. Among such criminal acts are theft (Article 177.2.3-1), acquisition, possession, shipment, or sale of narcotic drugs, psychotropic substances, or their precursors (Article 234.4.4), and organization or conduct of gambling activities (Article 244-1.2.2), among others. In addition, under the national criminal legislation, liability is also established for acts such as defamation or insult using fake usernames, profiles, or accounts on Internet information resources (Article 148-1), and illegal organization of international telecommunication services through connection to a telecommunication network (Article 233-4) [7, p. 55–57; 8, p. 18–19].

A portion of the numerous challenges encountered in the practical investigation of this category of crimes is determined by the large number of investigative actions that must be carried out, the complexity of conducting judicial examinations, and the specific characteristics of the evidentiary process. During the investigation of crimes committed through the use of information and communication technologies, particularly artificial intelligence, it becomes necessary to identify the circumstances to be proven as stipulated by Article 139 of the Criminal Procedure Code of the Republic of Azerbaijan (CCP RA).

According to Article 139 of the Criminal Procedure Code of the Republic of Azerbaijan (CCP RA), the circumstances to be proven include the fact and circumstances of the commission of the criminal incident; the connection of the suspect or accused person to the criminal act; the elements of the crime as defined by the criminal law; the culpability of the person in committing the act; mitigating and aggravating circumstances; and the circumstances relied upon by a participant in the criminal process or another person involved in the proceedings to substantiate their claim. The circumstances established in this article represent the general scope of matters included in the subject of proof [1, p. 301–302].

At the same time, it is clear that when determining the scope of circumstances to be proven in each criminal case, one cannot rely solely on the provisions of Article 139 of the CCP RA [2, p. 415]. Doctor of Law, Professor M.Ə. Cəfərquliyev correctly notes that “as can be seen from the content of Article 139 of the CCP, the law defines the subject of proof in general terms.” The author emphasizes that this is natural, stating that “it is impossible to provide a fully comprehensive list of circumstances to be determined in advance for a case. During the investigation of a criminal case, the determination of which facts are of significant importance or which circumstances should be directly proven depends on the specific characteristics of the case under investigation” [4, p. 242–243].

The authors of the national commentary indicate the necessity of including the following circumstances in the list of matters to be proven: the consequences of the crime, namely the volume and nature of the damage caused; circumstances eliminating the criminal nature of the act; grounds for exemption from criminal liability; whether the accused person should be punished for the committed act; circumstances characterizing the personality of the accused; and the reasons and conditions that contributed to the commission of the crime [2, p. 415].



It should also be noted that, although traditional elements are included in the subject of proof for cases involving crimes committed through the use of information technologies, their content increasingly reflects the digital nature of criminal activity and the specific characteristics arising from the commission of offenses in cyberspace and virtual environments.

In cases involving crimes committed through the use of information technologies, in addition to the general circumstances to be proven, it is essential to identify and establish the following:

Technical and electronic information demonstrating that the crime was committed using information technologies, social networks, the Internet, mobile devices, or other digital tools;

Determination of whether computer data served as the object or instrument of the crime;

Identification of which computers, servers, or networks were used, by whom, and during what periods; establishing what actions and operations were performed on these devices; determining whether the devices belong to the perpetrator, the victim, or a third party; how and for what purpose the perpetrator used information technologies and digital tools, including how they accessed the victim's data or misappropriated funds; assessment of the suspect's or accused person's ability to use information technologies and their habits in using modern digital devices, which may involve investigative actions such as investigative experiments; identification of the software used in committing cybercrimes, how it was obtained and applied, and the actions and operations performed with computer data; functional purpose of malicious software used in the commission of the crime, and at which stage of the criminal activity viruses, trojans, password-cracking tools, or other malware were employed; determination of which actions and operations (addition, deletion, modification, blocking) were carried out on computer data, or how the integrity of network resources was compromised; establishing the ownership of the devices, electronic data, and information stored on computers or other digital media; identification of the nature of personal information disseminated via the Internet, such as defamation, pornography, or material promoting national, racial, or other forms of hatred and hostility; in crimes against property or in the economic sector, determination of how funds were misappropriated or how illegal interference with bank accounts was carried out, specifying which computers, digital devices, and software tools were used, and other related circumstances.

In cases concerning the sale of narcotics through the use of information and telecommunication technologies, the circumstances to be proven may also include the following:

Establishing the use of the Internet, mobile communication devices, messengers, social networks, or other digital platforms during the process of selling narcotic substances; determining how exactly information technologies were used in committing narcotics-related crimes, including searching for buyers, coordinating the actions of accomplices, posting advertisements for sale, performing calculations, or organizing delivery; clarifying how narcotics were delivered to buyers; based on analysis of messenger correspondence, calls, and notifications, establishing agreements on sales and information about the locations where narcotics were placed; identifying the use of IP addresses, mobile devices, digital information, and payment systems to track the narcotics transfer chain; determining the use of information and telecommunication technologies, such as the Internet, social networks, or messengers, for online sales, promotion, advertisement, or encouragement of narcotics consumption; obtaining information about transactions conducted via online services, as well as correspondence in messengers.

In these and other cases, investigative and inquiry bodies, with the assistance of experts, must collect, record, preserve, and analyze digital data (such as logs, transaction records, Internet traffic, etc.).

It is necessary to determine the use of specific information technologies and digital tools as instruments and means of committing the crime, the characteristics and functional purpose of these tech-



nical-digital devices and tools, the content of the information obtained, and the technical aspects of how the act was carried out.

Since digital evidence forms the core of the evidentiary base in this category of crimes, digital evidence refers to information in electronic form that is significant for establishing the circumstances to be proven. Digital evidence can be classified as follows: data stored on physical media; information transmitted via telecommunication networks; metadata characterizing the conditions of file creation, modification, and transmission; system event logs, IP addresses, user activity logs, and similar records [18, p. 115].

At the same time, in the criminal procedure legislation of many countries, digital (electronic) evidence has not been formally included among the types of evidence, and the essence and content of digital evidence and digital (electronic) documents have not been defined at the procedural law level. For example, the Criminal Procedure Code of the Russian Federation (Articles 74 and 84) does not explicitly provide for the possibility of using electronic documents as evidence in criminal cases during the preliminary investigation stage [27, p. 127–128].

Article 124.1 of the Criminal Procedure Code of the Republic of Azerbaijan (AR CPC) states that “reliable evidence (information, documents, objects) obtained by the court or the parties to the criminal process shall be considered evidence in criminal prosecution.”

According to Article 124.2 of the CPC, the statements of the suspect, the accused, and the victim, as well as witnesses, expert opinions, physical evidence, protocols of investigative and court actions, and other documents are recognized as evidence in criminal proceedings. Article 135.1 of the AR CPC defines the concept of a document, specifying that any paper, electronic, or other medium that contains information relevant to criminal prosecution, represented in the form of letters, numbers, graphics, or other symbols, shall be considered a document.

Only in Article 1 of the Law of the Republic of Azerbaijan “On Electronic Signature and Electronic Document”, dated March 9, 2004, is an electronic document defined as “a document presented in electronic form for use in an information system and confirmed by an electronic signature.”

It should be noted that, unlike many post-Soviet countries, Uzbekistan has established the main provisions regarding the use of electronic (digital) evidence in its Criminal Procedure Code and the Law “On Electronic Document Circulation.” According to the legislation of this country, electronic documents, records, information, and other digital data, provided that the requirements for their registration, seizure, and examination are observed, can be accepted as evidence in criminal cases. Digital (electronic) evidence is defined as information in electronic-digital form that is significant for establishing the circumstances of a criminal case. This type of evidence may include electronic documents (text files, spreadsheets, graphics, etc.); audio and video recordings; information on electronic payments and financial transactions; data extracted from electronic devices (smartphones, computers, servers, etc.); and information from transmission networks and social media [17, p. 38–39].

Determining the method of committing a crime also holds particular significance [19, p. 51–56]. “The method of committing a crime is the specific technique or approach used by a person while carrying out a socially dangerous act. Regardless of whether the method is included in the elements of the crime, it must be clarified in each criminal prosecution” [2, p. 416–417].

In the digital environment, methods of committing crimes may include: the use of specialized software; exploiting existing vulnerabilities and flaws in information systems; application of social engineering techniques; use of artificial intelligence, particularly network technologies; and other similar methods.



Analysis of statistical data indicates that a significant portion of crimes such as theft, fraud, drug trafficking, and others are increasingly committed using “social engineering” methods and techniques. A.N. Ibrahimova notes in this regard: “Social engineering involves interacting with people to collect information from them. One of its main elements is deceiving the user by employing fake profiles (under a different name or representing a fictitious company, organization, etc.), virtual friendships, or acquaintances. Its primary goal is to collect information by exploiting trust gained through acquaintance, virtual friendship, or any other reliable source. Therefore, users must pay special attention to the addresses of incoming messages. Even a single altered character can create a fake website” [5, p. 8–9].

The technique of “social engineering” aimed at obtaining confidential information is commonly referred to in the literature and among specialists as phishing.

Phishing is a type of internet fraud in which personal user information—such as logins, passwords, mobile phone numbers, bank card numbers, and so on—is obtained by sending mass electronic messages, such as emails or text notifications, through email or other digital telecommunication channels. Unauthorized emails often contain links to websites specifically created for phishing, where users are prompted to enter their identifiers and passwords [24, p. 131]. Typically, criminals first send a fake notification to the victim via email or SMS, disguised as an official message from a bank, requesting that certain information be “verified” or that certain actions be performed. Subsequently, the criminal obtains the victim’s personal information, account details, or card number and password, resulting in the theft of funds from the victim’s bank account. Another method involves a criminal calling the cardholder, pretending to be a bank employee, and claiming that, due to a problem with the bank system or the victim’s account, the password must be provided; otherwise, the card will be blocked. Yet another approach is when the criminal, posing as a bank employee, gives false information about the victim’s eligibility for a loan and later extracts a certain amount of money under the pretext of insurance payments or other excuses. An additional online or internet fraud method involves posting fake offers about services or goods on public websites, initially requiring the transfer of a certain amount of money. These funds are, of course, transferred to the offender’s bank account [15, p. 27–28].

The algorithm (method) of committing drug-related crimes using information technologies can be described as follows: criminals create a website and post an advertisement for the sale of drugs on that site; they contact potential buyers via the specified electronic address or messaging apps to confirm the buyer’s intention to purchase; the order and payment agreement is reached remotely; and after the payment is made, information about the location of the drugs is sent via SMS, email, messaging apps, WhatsApp, or other social networks. For example, the scheme of drug distribution is characterized by high adaptability, which is determined by the following factors: the creation of websites on platforms that are difficult to block, the use of networks of bots as administrators, and the fact that participants in committing the crime do not know each other [25, p. 148].

In the specialized literature, it is noted that the use of artificial intelligence (AI) for criminal purposes can be considered a method of committing a crime. However, it should also be noted that this has not yet been codified at the legislative level. Among procedural scholars and law enforcement officers, there is no unified position on this issue. Some believe that in the near future AI will be regarded as an independent criminal subject, while others consider that, at present, AI should be assessed as a method for committing a crime [30, p. 66].

The investigation of crimes committed using information technologies is characterized by significant criminalistic and procedural features, which are determined by the specifics of the digital environment, i.e., cyberspace, and by the necessity of applying special technical and hardware-software tools for the collection of evidence.



According to Article 143 of the CPC of the Republic of Azerbaijan, the collection of evidence is carried out during preliminary investigation and court proceedings through procedural actions such as interrogation, confrontation, seizure, search, inspection, expert examination, presentation for identification, and other procedural measures.

One of the most effective tools for obtaining and collecting digital evidence is the OSINT method (sometimes also referred to as Internet intelligence). The use of open information sources, including the Internet, social media, open databases, and other resources, provides investigators and experts with additional opportunities to collect evidentiary information in cases under investigation. The application of OSINT methods allows filling gaps in traditional sources of evidence and helps to reveal digital traces of criminal activity that carry criminalistic significance.

Considering that OSINT methods consist of a set of analytical techniques aimed at the collection, processing, and analysis of information from publicly accessible sources, it can be noted that their application in the context of cybercrime investigation significantly expands the capabilities of investigators and experts when conducting actions aimed at establishing the circumstances of the case. In this process, the use of Internet resources (websites, social networks, forums, blogs), open databases and registries, and mass media, as well as specialized information-analytical resources, enables the collection of various digital evidence, including electronic documents and correspondence, financial transactions and payments, data stored on mobile devices and computers, and information from social networks and other online sources.

It should also be noted that digital evidence obtained through OSINT methods requires strict compliance with procedural rules during its recording and collection. This means that during the search, collection, and extraction of copies of information, the integrity and immutability of digital evidence must be ensured, and the seizure and packaging of information carriers must be carried out in accordance with procedural regulations and properly documented.

All of these measures are essential to ensure the admissibility and reliability of digital evidence [17, p. 38–39].

The search and seizure of computer-technical devices, including digital devices, and the electronic information they contain that has forensic significance, require strict adherence to procedural rules to ensure the preservation and integrity of digital evidence. The main requirements include: immediately disconnecting the devices from the power supply to prevent remote deletion or destruction of data; creating exact copies of the information carriers; documenting all technical actions and operations in accordance with procedural legislation; ensuring the immutability of the original information carriers. A decisive factor is also the timing of these investigative actions, since digital traces can be destroyed within seconds. This necessitates rapid response from law enforcement agencies [18, p. 116].

In response to the dangers, threats, and challenges posed by cybercrime, there is a significant need for a specialized field that enables the detection and investigation of such crimes, as well as the identification, preservation, analysis, and presentation of digital traces of criminal activity. Currently, in the doctrines, judicial-investigative, and expert practices of post-Soviet countries, this field is recognized as computer-technical expertise (digital expertise) within forensics or digital criminalistics [22, p. 196].

The term “forensics” originates from the Latin word *foren* – meaning “speech before the forum,” i.e., a presentation in court. This term has entered our language from the English word *forensic* or the abbreviated form forensic science and refers to the science of evidence examination, meaning “judicial science.” In short, forensic computer criminalistics is the science of studying digital evidence and the mechanisms of the formation of digital traces, as well as the methods, techniques, and digital technical-software tools and technologies for their detection, analysis, and evaluation [26, p. 11].



Forensics encompasses a wide range of methods and technologies aimed at the collection, analysis, and presentation of digital evidence in court. This field of knowledge integrates elements of criminalistics, information security, and both substantive and procedural law [22, p. 196; 31, p. 235].

The purpose of digital criminalistics is to collect, record, preserve, analyze, and present evidence related to the issues that need to be resolved. From a technical perspective, digital criminalistics helps determine what has occurred within an information-computer system and networks, as well as uncover the causes of system intrusions, identify legal violations that occurred in the system, and trace their sources.

The purpose of digital expertise (digital forensics) is to detect, identify, collect, record, preserve, restore, analyze digital data (digital traces) stored on digital media such as computers, mobile devices, and so on, and to present the results of these specialized investigations in the form of a report. In this context, digital traces refer to any information of criminalistic significance, that is, data presented in the form of electrical signals regardless of the means of storage, processing, or transmission [28, p. 73].

The main types of digital expertise can be classified as follows: software digital forensics, data digital forensics, digital network forensics, and mobile device digital forensics.

The purpose of software digital forensics is to study a set of issues related to the software installed on the computer system or other computerized digital devices submitted for investigation. This includes analyzing the software's functional purpose, properties, characteristics, algorithms, structural features, current state, and the causal relationship between the user's actions and the outcomes, among other aspects.

Data digital forensics is primarily focused on the examination of structured digital information within systems and databases in cases of cybercrimes, including crimes committed in the property and economic sectors using computer and information technologies, as well as in the judicial resolution of certain civil disputes. The purpose of digital data forensics is to obtain evidentiary digital information by searching for, detecting, analyzing, recovering, and evaluating information generated as a result of information process management programs within a computer system or created by a user. This is achieved through solving diagnostic and identification-related tasks [23, p. 526].

The main task of network forensics is the monitoring, recording, and analysis of network activity. Network data are highly dynamic and even volatile, often at risk of being lost after transmission. This means that network forensics is a proactive, specialized investigative process conducted within the framework of digital forensics.

The tasks of mobile device digital forensics include bypassing screen locks, extracting data from drones, locked devices, mobile phones, smartphones, and iPhones, reading memory cards, retrieving information from SIM cards, collecting data from messengers such as WhatsApp, Viber, Skype, and Twitter and from cloud services like Mi Cloud, Samsung Cloud, etc., as well as determining geolocation, frequently visited locations, routes, and other relevant information.

Although most national criminal procedure legislations do not formally define a specific concept of "digital evidence," courts generally admit such evidence in various categories of cases.

At the same time, procedural legislation establishes certain criteria regarding admissibility. Thus, according to Article 125.1 of the Criminal Procedure Code of the Republic of Azerbaijan (admissibility of evidence), information, documents, and other items may be accepted as evidence if there are no doubts regarding their authenticity, sources of origin, and the circumstances of their acquisition.

The main criteria for the admissibility of digital evidence include: compliance with evidence collection procedures; ensuring the integrity of data during seizure and examination; documenting the chain of



actions and operations performed with digital media; and the authorization of personnel handling the digital evidence.

Among the specific challenges that arise during the detection and investigation of cybercrimes, the following can be highlighted: the possibility of creating forged digital documents, accounts, profiles, and domain names using modern technologies; the complexity of determining the creation and modification times of files; problems with authentication of electronic notifications and digital signatures; the potential for altering file metadata, adding to or deleting data, and other operations; the use of anonymizing networks such as “Tor” or “VPN” by criminals to conceal their identity; the use of cryptocurrencies and other digital currencies in financial transactions that complicate tracking of money flows; and the application of modern encryption algorithms that practically prevent decrypting information without the key, among others.

CONCLUSION

The conducted research has made it possible to reveal a number of systemic features of cybercrimes that distinguish them from traditional forms of legal violations. Among them, the following can be highlighted:

1. The digital nature of traces of criminal activity requires the development and application of fundamentally new approaches to their collection, recording, examination, and evaluation. There is a need to adapt traditional procedural mechanisms to the realities of the digital era.
2. The characteristic features of cybercrimes, which differentiate these criminal acts from other crimes, include: anonymity; global reach; technical complexity; large scale; accessibility of the object of the criminal intent; existence of favorable conditions accompanying the preparation and commission of the crime; systematic latency, i.e., hyper-latency; transnationality; gaps in substantive and procedural legislation regulating the detection and investigation of cybercrimes, and the incomplete formation of the normative-legal framework in this field, etc.
3. The absence of norms and provisions in the majority of national procedural legislations that specifically regulate digital evidence creates legal uncertainty and significantly hinders the evidentiary process.

From this perspective, it can be considered that the adoption of the UN Convention on Cybercrime on December 24, 2024, represents a significant step toward the harmonization of international approaches and the implementation of international standards into national legislation.

The evidentiary process in cases of crimes committed using information technologies is characterized by significant features determined by the digital nature of criminal activity. It is possible to predict that the rapid growth of cybercrime will continue exponentially in the coming years. These dangerous trends make it essential to improve the evidentiary system in cases of the aforementioned categories of crimes, both at the national and international levels.

In the evidentiary process for crimes committed using information technologies, the main problem lies in the presence of certain gaps in substantive and procedural law, considering the current level of technological development. From this perspective, it is necessary to identify directions for improving the existing legislative system and to develop concrete proposals and recommendations for each of them.

Moreover, it is unequivocally important to enhance the scientific-methodological, organizational-technical, technological, and procedural foundations for investigating and examining the criminalistic aspects of crimes committed using information technologies. This particularly concerns in-



dividual investigative actions in such cases, especially urgent procedures such as on-site inspections, searches, seizures, and the conduct of digital forensic examinations.

Considering the dangerous trends observed regarding the state, structure, and dynamics of cyber-crimes, as well as the emergence of crimes committed using artificial intelligence in developed countries in recent years, characterized by a steady growth rate, it is necessary that in Azerbaijan criminal liability be established at the legislative level for acts committed using information technologies, including artificial intelligence, for criminal purposes. Provisions of the Criminal Code, particularly those establishing liability for crimes against property, public safety, and morality, should include this feature as an aggravating circumstance. Similarly, provisions should be added to Article 7 of the Criminal Procedure Code clarifying the essence of terms and concepts such as “electronic (digital) evidence,” “information and telecommunication technologies,” “information resources,” “artificial intelligence,” and others. In addition, Article 124 of the Criminal Procedure Code should include “digital (electronic) evidence” as a new type of evidence.

In addition, the criminal and criminal-procedural legislation should be harmonized with the provisions of the 2024 Convention on Cybercrime, and the implementation of these provisions at the national level must be ensured.

In cases involving crimes committed using information technologies, the circumstances to be proven, as well as the collection, preservation, recording, analysis, evaluation, and presentation of digital evidence in such cases, should be developed based on tactical-criminalistic and procedural principles. The search, detection, seizure, and examination of digital traces must utilize the most advanced tactical-criminalistic methods, techniques, and tools, including hardware-software resources, the latest digital technologies, and the capabilities of artificial intelligence.

The fight against cybercrime is an international-scale issue. This is because the prevention, detection, investigation, and prosecution of crimes committed using modern information technologies cannot yield effective results at the national level alone, given the transnational and cross-border nature of the Internet.

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REGULATORY CHALLENGES TO INVESTIGATING AI-DRIVEN CYBERCRIMES

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ABSTRACT

Purpose: The exponential growth of artificial intelligence (AI) technologies has revolutionized various sectors, including communication, healthcare, finance, and law enforcement. However, this same technology has also been co-opted by cybercriminals, giving rise to new forms of digital threats that are more autonomous, adaptive, and difficult to trace. AI-driven cybercrimes such as deepfake manipulation, automated phishing, AI-enhanced ransomware, and botnet attacks challenge conventional models of crime investigation, legal responsibility, and digital evidence admissibility. The aim of this research is to critically examine the regulatory challenges that hinder the effective investigation and prosecution of AI-driven cybercrimes.

The problem statement is that existing legal systems are not sufficiently equipped to regulate or respond to the unique challenges posed by AI technologies in cybercrime. Current laws often lack precise definitions for AI tools used in criminal activity, clear rules for assigning liability when autonomous systems are involved, and consistent procedures for handling digital evidence generated or manipulated by AI. The objective of the study is to:

1. Identify the specific features of AI-driven cybercrimes that complicate legal investigations,
2. Assess the adequacy of current international and domestic legal instruments, and
3. Propose policy and legislative recommendations for more effective regulation and enforcement.

The research question is: How can legal frameworks be adapted to effectively regulate and investigate cybercrimes involving artificial intelligence?

The significance of this research lies in the fact that, as the global community increasingly relies on AI-powered systems, the risks of unregulated or malicious AI applications in cyberspace grow exponentially. This research seeks to contribute to international cyber law discourse in building more resilient legal infrastructures for the digital age.

Design/Methods/Approach: This research adopts a doctrinal legal methodology supported by comparative legal analysis and qualitative document review. Primary and secondary legal sources will be gathered exclusively from publicly accessible official web portals of international organizations, government bodies, and legal institutions. To ensure the reliability and academic integrity of the data, the CRAAP Test (Currency, Relevance, Authority, Accuracy, and Purpose) will be applied to evaluate the quality of each source. Only open-source materials available in the public domain will be used, ensuring transparency and adherence to ethical research practices.

Findings : The study reveals significant regulatory challenges in investigating AI-driven cybercrimes through recent high-profile cases involving artificial intelligence and digital harm. First, there is a major lack of legal clarity regarding liability for the unauthorized use of data by AI systems. This is evident in the consolidated US copyright lawsuits against OpenAI and Microsoft, where twelve cases brought by prominent authors (such as John Grisham, Jonathan Franzen, and Ta-Nehisi Coates) and

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media outlets including the New York Times argue that their copyrighted content was used without consent or compensation to train large language models (LLMs) like ChatGPT and Microsoft Copilot. These lawsuits highlight the challenge of establishing responsibility when AI systems are trained on vast datasets, often scraped indiscriminately from the internet. The fact that many of these cases were transferred to a single district court for consistency underscores the systemic uncertainty in current regulatory frameworks about how to handle AI-generated infringement and associated evidence.

Second, the manipulative power of deepfakes and generative AI technologies poses a growing threat to personal dignity, reputational rights, and public trust. The fake deepfake video involving Scarlett Johansson, in which she was depicted along with other Jewish celebrities in a fabricated message targeting Kanye West, underscores the dangers of AI-generated disinformation. This case reveals regulatory gaps in safeguarding individuals against AI-enabled identity theft, defamation, and synthetic media abuses. It also raises serious concerns about the admissibility and verification of AI-altered content as legal evidence and the absence of robust deterrents against such misuse.

Originality/Value: This paper advances the frontier of cyber law by addressing the underexplored intersection of artificial intelligence and cybercrime, offering a timely and original analysis of how autonomous systems are reshaping the nature of digital threats and legal responses. Its core value lies in critically identifying the gaps in current regulatory frameworks that struggle to keep pace with the rapid evolution of AI technologies, particularly in the context of evidence, attribution, and jurisdictional complexity.

The study's originality is further illustrated through real-world cases, including the unprecedented incident in April 2025 when a New York appellate court was confronted with an AI-generated avatar attempting to deliver oral arguments on behalf of a self-represented litigant. The judges' swift intervention and refusal to allow the avatar to continue highlighted a deep unease within the judiciary regarding the lack of procedural safeguards, authenticity, and legal accountability in AI-mediated legal interactions. This research proposes targeted reforms to ensure that AI-generated content is treated with appropriate evidentiary scrutiny, that liability regimes are adjusted to include algorithmic actors, and that transnational cooperation is bolstered through harmonized legal standards.

Keywords: AI Cybercrimes, Digital Evidence, Cyber Law, International Frameworks.

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INTRODUCTION

A single deepfake video can spread across the internet in minutes, destroying reputations and confusing millions of people before the truth is revealed (Pesetski, 2020). Imagine a world where a fake video can ruin someone's career, or a smart computer program can steal millions without a human hand guiding it. This is not science fiction; it is happening now through AI. This shows how AI, while powerful and useful, can also be turned into a dangerous tool for cybercrime (Rahman-Jones, 2025). Criminals now use AI to create fake identities, launch smart phishing attacks, and design ransomware that learns and adapts (Burton et al., 2025). The laws we have today were not built for crimes



committed by machines that can act on their own (Nerantzi & Sartor, 2024). Understanding how to regulate and investigate these threats is not just interesting, it is essential for protecting trust, security, and justice in the digital age.

Cybercrime has been a problem since the early days of the internet, but the rise of Artificial Intelligence (AI) has made it more complex and dangerous (Krishna, 2024). In the past, cybercrimes were mostly carried out by humans using simple tools like viruses, spam, or malware. Today, AI makes it possible to create smarter attacks that are faster, harder to detect, and able to adapt to defenses (Guembe et al., 2022). Examples include deepfake videos, automated phishing, and AI-powered ransomware. However, there is still little research on crimes that are directly driven by AI. Existing laws do not clearly explain who is responsible when AI systems cause harm, and they do not provide strong rules for handling AI-generated evidence.

We already know that AI is being used by criminals to create new forms of cybercrime that are faster, smarter, and more damaging than before. What makes the problem worse is that AI can act without direct human control, which makes it difficult to know who should be held responsible (Königs, 2022). Current laws were designed for crimes committed by humans, not machines, and this creates confusion in investigations and court cases (Mahardhika et al., 2023). For example, there are no clear rules on how to handle digital evidence that may have been changed by AI, or how to assign liability when AI tools are misused. We still need to understand how legal systems can adapt to these new challenges.

The debate on AI-driven cybercrime keeps returning to three pressure points: evidence, attribution, and coordination, yet these are the very places where law and policy fall silent. On evidence, proposals to adapt authentication rules for synthetic media and to treat AI outputs as a special class of electronic evidence show promise yet remain unsettled (Pantanowitz et al., 2024). Digital-forensics work documents weak standards for handling and validating manipulated data, and even decision-making biases during triage, suggesting courts risk admitting or excluding the wrong evidence (AllahRakha, 2025). On threat characterization, technical reviews show adversaries leveraging machine learning at scale for zero-day exploitation, adaptive malware, and federated tactics. EU landscape reports also confirm ransomware and DDoS dominance across sectors. However, they stop short of linking these findings to enforceable legal tests, leaving a gap between technical evidence and legal frameworks (Mohsen-dokht et al., 2024).

Botnet surveys highlight AI-driven command-and-control and detection arms races, underscoring the need for standards on provenance, audit trails, and model transparency (Hyslip & Pittman, 2015). On liability, doctrinal analyses argue current criminal law lacks clear theories for assigning fault when autonomous or semi-autonomous systems generate harm, and they diverge on whether to ground culpability in designers, deployers, or a new legal subject (Gaeta, 2024). Internationally, cooperation initiatives emphasize policy alignment against ransomware but provide limited procedural guidance for cross-border AI evidence and shared model-risk audits (Härmand, 2023). Most literature points out the challenges, yet stops short of offering workable tools such as chain-of-custody standards, reliability checks, or jurisdictional rules for AI-driven acts.

Many scholars agree that AI-driven cybercrime is a fast-growing threat, yet critical gaps remain as criminals exploit AI to outpace weak laws, unreliable forensics, and unprepared justice systems. They also discuss liability and the need for stronger cooperation across borders. These are strengths because they give a good overview of the risks. However, most studies stop at describing problems and do not offer practical legal solutions for courts or investigators. There is little work on how to adapt rules of evidence when AI content may be fake or manipulated. Few studies explain how to assign liability fairly when AI systems act without direct human control. Even less research connects technical advances in AI with concrete legal reforms. The objective of the study is to:



- Identify the specific features of AI-driven cybercrimes that complicate legal investigations,
- Assess the adequacy of current international and domestic legal instruments, and
- Propose policy and legislative recommendations for more effective regulation and enforcement.

The research question is: *How can legal frameworks be adapted to effectively regulate and investigate cybercrimes involving AI?*

The rapid rise of AI in cybercrime has outpaced the ability of laws and regulations to respond, creating urgent gaps in justice and security. AI-driven crimes raise new questions about evidence, liability, and international cooperation. If these questions are not answered, courts may struggle to deliver justice, and criminals may take advantage of the legal gaps. The importance of this research is that it provides a clear analysis of where the weaknesses are and suggests ways to improve legal systems. Its impact on the research field is to expand cyber law by adding specific focus on AI, which has not been studied in depth. It contributes new knowledge on how to handle AI-generated evidence and assign responsibility in cases involving autonomous systems.

METHODOLOGY

This study uses a qualitative research design because it focuses on laws, policies, and strategies rather than numbers or statistics. The object of the study is a broad set of cybercrime regulations and policies, while the sample specifically focuses on rules and responses related to AI-driven cybercrimes. Data was collected from Google Scholar using keywords such as AI cybercrimes, digital evidence, cyber law, and international frameworks, and from official websites to ensure authenticity. Only peer-reviewed journal articles and official legal documents were included. The CRAAP test was applied to check validity and reliability, focusing on sources that are current, relevant, accurate, and credible. Data was analyzed through doctrinal and document analysis methods. All information comes from the public domain, with full citation to original authors to ensure integrity. The study is limited because laws and technology keep changing, which may affect the future value of findings. It assumes that sources are reliable and represent the true state of knowledge.

RESULTS

This study looks at the problem of AI-driven cybercrimes and how legal systems can deal with them. The main question is how laws can be adapted to regulate and investigate crimes involving AI. The research explored issues such as evidence, liability, and international cooperation. It focused on cases where AI created new challenges for courts, investigators, and lawmakers. The aim was to find where current rules are weak and to suggest possible reforms. This is important because AI crimes are growing, and traditional laws are not enough.

The research found that the biggest challenge in AI-driven cybercrime is the lack of legal clarity (AllahRakha, 2024). Current laws do not say clearly who is responsible when AI is misused or when it acts in ways not directly controlled by humans (Christen et al., 2023). Courts face serious problems with digital evidence that may be altered or generated by AI, because it is difficult to prove what is real and what is fake (Runyon, 2025). International rules are also weak, as countries use different systems and often cannot cooperate fast enough to stop global cybercrime (Wang, 2024). This means that criminals can exploit AI technology without facing clear punishment, while victims may not get justice.



One interesting finding pertains to how quickly criminals adopt AI tools for their attacks (André Maio, 2025). For example, phishing emails powered by AI are far more convincing than older ones, making it harder for people to tell the difference. Another example involves deepfakes, which are no longer just entertainment but powerful tools for fraud and defamation (Lundberg & Mozelius, 2025). The research also shows that even courts and legal professionals are experimenting with AI, such as the unusual case of an AI avatar appearing in court. This shows that AI is not only a problem in cybercrime but also in the justice system itself (Daniel, 2025). Another surprising point is that while governments talk about the use of AI, most have not updated their laws to match (Miranda, 2025). This gap between awareness and action creates serious risks. These findings highlight that AI is changing not only crime but also how justice works, and that reforms cannot be delayed.

The study shows four main findings. First, AI-driven cybercrimes are more complex and harder to investigate than traditional cybercrimes. Second, current laws do not clearly explain how to handle AI-related evidence or assign liability when autonomous systems cause harm. Third, international cooperation is weak, and this makes it harder to deal with crimes that cross borders. Fourth, there is a gap between the speed of AI development and the slow pace of legal reform. Together, these findings show that legal systems are not yet ready for the new challenges created by AI. The results make it clear that there is an urgent need for reforms that focus on evidence, liability, and cooperation. Without these, AI will continue to give criminals an advantage over justice systems worldwide.

An unexpected finding was the strong reaction of judges to AI inside the courtroom (Fine et al., 2023). The case of an AI avatar trying to present arguments in a New York court revealed deep fears in the legal system itself. This was not expected, because most research focuses on criminals using AI, not legal professionals confronting AI directly. Another unexpected finding is how much copyright disputes, like the lawsuits against AI companies for data use, connect to cybercrime debates (Montgomery, 2025). While they are not crimes in the traditional sense, they show how unclear laws are when AI uses data without permission. This link between intellectual property law and cybercrime was not obvious before. It shows that the impact of AI is wider than expected and touches many areas of law.

The research question asked how legal frameworks can be adapted to regulate and investigate AI-driven cybercrime. The results show that laws must change in three main ways. First, liability rules must be updated so that responsibility is clear when AI systems cause harm. Second, courts need stronger rules for handling AI-generated or manipulated evidence, including standards for verifying digital content. Third, international cooperation must be improved, since AI-driven crimes often cross borders and no single country can handle them alone.

DISCUSSION

When AI Becomes the Criminal Tool

Once deployed, AI tools can act independently. This autonomy makes them harder to trace back to the criminal (Caldwell et al., 2020). Evidence from phishing cases shows that AI-generated emails are nearly indistinguishable from genuine communication, reducing the ability of victims to detect fraud. While the strength of this evidence lies in real-world cases, its weakness is that many studies remain descriptive rather than quantitative. This means we lack strong statistical measures of impact. Still, the consistency across regions strengthens the evidence that AI has changed the game. Unlike past cybercrimes, these attacks are not just human-driven. They involve systems that partially think and act on their own. This raises deep questions about responsibility in law.



AI crimes are unique because they combine autonomy, speed, adaptability, and deception. Autonomy allows attacks to run without constant human input. Speed means AI systems can attempt thousands of intrusions in seconds, overwhelming defenses. Adaptability allows malware to switch tactics instantly if blocked. Deception shows up in deepfakes and AI phishing, designed to fool even experts (Park et al., 2024). Research on ransomware and deepfakes confirms these risks, though controlled lab studies often fail to capture the messy reality of cybercrime. While weak security or human error may also explain some breaches, repeated findings suggest AI itself is a new risk factor that amplifies criminal power (Završnik, 2020).

Investigations are especially difficult because AI blurs intent and liability. If an AI adapts mid-attack, was it by design, or did the system ‘decide’ on its own? This uncertainty makes it harder to assign blame (Fernandez-Basso et al., 2025). Forensic work also struggles to separate genuine evidence from AI-manipulated content, reducing trust in digital proof. In Minnesota, a judge struck expert testimony relying on AI-generated citations in a deepfake-related case (Thomas, 2025). This demonstrated how even legal experts can be misled by AI hallucinations; similarly, in Maryland, a high-profile case involved an AI-generated deepfake audio of a school principal, complicating the chain of custody and evidentiary reliability (Lake, 2024). Across the Atlantic, Europol’s 2025 Serious and Organized Crime Threat Assessment warns that AI-enhanced organized crime featuring voice cloning, deepfakes, and synthetic fraud has made digital evidence even more volatile and deceptive throughout the EU (Aleksandrowicz, 2025).

Court systems themselves are unprepared: experts warn that mounting sophistication in AI content makes verifying authenticity harder, as courts lack both sufficient forensic tools and trained personnel. Most public discussion centers on these headline-making episodes, while smaller-scale crimes like manipulated evidence in custody disputes or low-budget fraud go unreported. Earlier cybercrime research centered on human intent; today’s reality is more complex, where machines are active participants in the crime (Farooq & De Vreese, 2025). Recent legal disputes make this clear. Lawsuits over AI trained on copyrighted data show harm caused directly by systems, not just by their users.

Why Today’s Laws Fall Short

Domestic and international laws are not built for AI-driven crime. Most frameworks were written long before AI gained autonomy. As a result, they struggle to handle crimes committed or supported by intelligent systems. Recent copyright litigation such as *Bartz v. Anthropic*, where Judge William Alsup ruled that using purchased books for AI training may be fair use, but storing millions of pirated copies is not exposed a clear legal gap (Sherman & Hooker, 2025). Judges struggle to apply decades-old statutes to novel harms emerging from AI. International agreements, such as the Budapest Convention, support cross-border cooperation. Yet they offer little guidance on AI-generated evidence or algorithm-driven liability. The evidence is credible because it comes from real cases and treaties, but weak because it reflects early debates rather than lasting solutions (Carpenter, 2025).

Current laws focus on human action, intent, and harm. This model breaks down when AI generates phishing emails or deepfakes without direct human input. Judges often search for the “human actor behind the machine”, but this approach leaves gaps. Many AI-driven crimes involve minimal or indirect involvement by people. Case reviews show a consistent pattern: courts hesitate to treat AI as anything more than a tool, even when systems act with independence. This reflects a global legal bias toward human accountability, but it leaves crimes committed through AI in a gray zone (Daniele, 2024).

Another problem is the lack of clear definitions. What does “autonomous decision-making” mean in law? Without precise language, courts treat similar cases differently, which erodes trust in justice.



Ongoing lawsuits against AI companies show deep disagreement: is AI output original work, manipulated data, or stolen property? These conflicting interpretations make it harder to assign liability to designers, users, or corporations. Evidence is strong because it comes from real disputes, though most involve civil law, so lessons may not transfer cleanly to criminal justice (Nastoska et al., 2025).

Global inconsistency makes things worse. Some countries are quick to update their laws, while others lag behind. This creates loopholes that criminals exploit. A deepfake scam may be illegal in one country but ignored in another, offering safe havens for offenders (Sandoval et al., 2024). Reports from ENISA and the Council of Europe confirm that cross-border cooperation often collapses when data moves between jurisdictions with mismatched standards. The evidence here is strong, but biased, since many countries underreport AI-related crimes.

U.S. lawsuits against OpenAI and Microsoft test whether training AI on massive datasets is theft or fair use (Chen, 2025). Courts remain divided, revealing a major gap in ownership and liability rules. Deepfake misuse offers another example: fabricated videos used for fraud or reputational harm often outpace the legal system's ability to verify or punish. These cases are compelling because they involve high-profile courts and global attention. Still, most rulings are pending, so long-term outcomes remain unclear. Some argue the issue is not weak laws but unsettled ethical norms. Either way, today's legal systems are not ready for the speed and complexity of AI-driven crime.

Truth and Trust in AI Evidence

Courts today face serious problems when dealing with AI-generated or altered evidence. Deepfakes, synthetic texts, and altered audio can look real, leaving judges unsure what to trust (Young, 2025). Many courts lack clear rules on how to admit or reject such material, which leads to inconsistent rulings. This uncertainty weakens justice, as outcomes depend more on discretion than on reliable standards. Digital forensics has not kept pace with AI's ability to manipulate content, raising the risk of both error and abuse (Analiza V Muñoz, 2025). Some courts may even reject genuine evidence out of caution, while others may admit fakes. Either way, truth suffers.

Authentication and verification are more difficult in the AI era because traditional forensic methods were designed for older forms of digital data, such as metadata, file integrity, or IP tracing (Malik et al., 2024). They often fail against AI-generated content, which leaves no conventional fingerprints. Investigators struggle to prove origin or authenticity. Detection tools exist, but they are limited, biased, and easy to bypass. Watermarking of AI output is still rare (Dathathri et al., 2024). Optimists argue that technology will eventually solve this, but for now the gap is critical. Without new forensic standards, courts risk losing the ability to trust digital evidence at all.

This creates two dangerous risks: admitting false evidence or rejecting true evidence. If manipulated material enters court, the innocent may be punished while the guilty escape. If authentic evidence is dismissed as fake, victims are denied justice. Current studies confirm how hard it is to separate genuine from fabricated AI content, leaving judges to rely on personal judgment. Compared to older digital forensics, this problem is far more serious, AI makes fakes almost indistinguishable from reality (Steven, 2021). When truth is uncertain, public trust erodes. Victims may hesitate to report crimes, while citizens lose confidence in legal institutions (López-Borrull & Lopezosa, 2025).

The risk is not only technical but moral. Justice depends on trust as much as law. Unlike earlier cyber challenges, AI manipulation is sharper and more dangerous, because it can strike at reputations, elections, even national security. While courts may eventually adapt, the rapid pace of AI leaves little time to catch up. Possible solutions exist but remain underdeveloped. These include mandatory watermarking of AI content, stricter chain-of-custody rules, advanced forensic tools, and expert panels to assess



AI evidence before trials. Such reforms would limit judicial discretion and reduce bias. Yet challenges remain: tools are still imperfect, and questions of cost and responsibility whether governments, courts, or tech companies should lead are unresolved. The path forward is clear: if courts want to remain credible, they must quickly adapt laws and tools to protect truth in the AI era.

Building Smarter Rules for the Future

The hardest question is who should bear responsibility when AI causes harm. AI tools complicate this because they act with autonomy. Some suggest liability should fall on developers, owners, or users. Others propose shared models. Evidence from deepfake scams and AI ransomware shows that victims often face injustice when liability is vague. The strength of this evidence is that it reflects real harm. Its weakness is that laws differ widely, so fairness cannot be applied equally across borders. Alternative explanations, such as weak security or careless users, exist but they do not fully explain AI's independent role. Compared to older cybercrime, AI introduces new ethical and legal dilemmas. Effective liability models must balance fairness, cost, and deterrence to protect both victims and society (Custers et al., 2025).

Evidence is the backbone of justice, yet AI undermines it. Deepfakes and synthetic content can fool even experts. Courts risk admitting false material or dismissing truth, both of which erode justice. Current rules assume human-created evidence and are not designed for AI. Recent fraud cases involving deepfakes confirm the danger, though much research remains technical rather than legal. Forensic tools exist but often fail against advanced manipulation. Unlike earlier digital evidence challenges, AI makes the problem more complex. New rules for authentication, verification, and presentation of AI evidence are essential to restore trust in courts (Popa et al., 2025).

AI crimes are global by nature. Criminals operate across borders, but legal systems remain fragmented (Fidler, 2025). This mismatch slows down investigations and leaves many victims without help. International ransomware attacks reveal the problem clearly: states fail to act together, and criminals escape (Meurs et al., 2024). Most data come from Western contexts, but the threat is worldwide. Experts argue bilateral agreements are enough, yet evidence shows they move too slowly for AI-enabled attacks. Global standards on liability, evidence, and cooperation are no longer optional, they are urgent. Without them, criminals will continue to exploit borders while victims remain unprotected.

Even inside the courts, readiness is low. Judges and lawyers need training to understand AI technology, evaluate evidence, and apply rules fairly (L. Kimbrough, 2025). Some of the problem comes from limited funding or outdated legal education, but the speed of AI innovation is the biggest factor. Earlier studies called for digital literacy; today the need is for AI literacy. Training, resources, and expert support will reduce errors, bias, and delays. Without this investment, justice systems risk falling behind. With it, they can become strong enough to face the digital future.

CONCLUSION

AI has become a powerful force in shaping the future of crime and justice. It is not only a tool for progress but also a weapon in the hands of criminals. AI-driven cybercrimes such as deepfakes, adaptive phishing, and AI-powered ransomware show how quickly technology can outpace the law. The research shows that the greatest risks come from unclear legal responsibility, weak rules for AI-generated evidence, and poor international cooperation. These challenges are linked because weak liability



systems make it harder to punish offenders, unreliable evidence makes it harder to prove guilt, and poor cooperation lets criminals cross borders freely.

The central claim of this study is that legal frameworks must evolve to address crimes powered by AI. Laws designed for human actions cannot handle machines that act independently or manipulate evidence. Stronger liability rules, better evidentiary standards, and harmonized international policies are essential to protect society from these new threats. The discussion of results shows that reform is possible and necessary. Smarter liability models would make responsibility clear. New evidentiary rules would strengthen trust in courts. International frameworks would close the gaps across borders. Training and resources for legal professionals would prepare justice systems for the challenges ahead. These measures work together to create a safer and more reliable system.

There are voices that insist current laws and corporate self-regulation are sufficient to manage AI crimes, but this belief ignores the scale and speed of the threat. However, evidence shows that AI develops too fast for outdated rules, and profit-driven self-regulation cannot protect the public from harm. Readers should see that adapting laws is not only reasonable but urgent. This study contributes to the growing field of cyber law by connecting AI-driven threats with practical reforms. The insights apply to governments, courts, businesses, and individuals. The findings suggest that protecting evidence, clarifying liability, and promoting cooperation are the key to a fair digital future.

There is still more work to be done. Future research should explore how liability can be shared between developers, users, and owners. More studies are needed on methods for verifying AI-generated content in court. International dialogue must continue to build global standards. Practical next steps include pilot programs for AI evidence protocols and training courses for judges and investigators. The same urgency that opened this study remains true at its end. If a single deepfake can damage a life in minutes, only strong and forward-looking legal systems can protect dignity, trust, and justice in the age of AI.

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INTEGRATING KNOWLEDGE MANAGEMENT AND ARTIFICIAL INTELLIGENCE TO OVERCOME CONTEMPORARY CHALLENGES IN DETECTING AND PROVING CRIME

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ABSTRACT

Purpose: This study explores how integrating knowledge management (KM) systems with artificial intelligence (AI) can effectively address contemporary challenges in detecting and proving crime, particularly concerning increasingly sophisticated criminal activities.

Design/Methods/Approach: The research employs qualitative analysis of recent case studies and literature review, focusing on existing KM frameworks and rapid AI-based analytic tools. This approach allows for swift assessment and immediate application in practical investigative contexts, suitable for short-term investigative requirements.

Findings: Preliminary results demonstrate that AI-driven KM systems significantly improve crime detection and evidence-gathering processes. Enhanced data analytics, predictive modeling, and automated evidence correlation provided by AI augment traditional investigative techniques, enable quicker response times and improved accuracy in criminal investigations.

Originality/Value: This paper uniquely bridges the gap between KM practices and contemporary forensic investigation methodologies by introducing AI capabilities as a central element of criminal justice frameworks. The approach presented here not only extends theoretical understandings but also offers practical implications for law enforcement agencies facing advanced crime threats, thereby contributing to safer communities.

Keywords: artificial intelligence, artificial knowledge, crime detection, forensic investigation, knowledge management, predictive analytics.

About the author

Major **Alexandru Ioan**, PhD, is a seasoned professional with extensive experience in law enforcement and management roles, excelling in leadership and organizational operations related to public safety and security. His expertise covers strategic planning, interpersonal communication, and criminal investigations, supported by advanced degrees in management, economics, and legal sciences. Actively engaged in continuous professional development through certifications and training in cybersecurity, law enforcement, and project management, Alexandru Ioan possesses a versatile skill set including digital competencies, technical proficiency, and multilingual capabilities, allowing effective contributions across organizational contexts.

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PURPOSE

The accelerating complexity of criminal phenomena, coupled with the exponential growth of digital data, requires law-enforcement agencies to evolve beyond traditional information management toward intelligent knowledge ecosystems. This study aims to explore how the integration of Knowledge Management (KM) and Artificial Intelligence (AI) can strengthen the processes of detecting and proving crime, while safeguarding ethical, legal, and evidentiary standards. Building upon the conceptual foundations of knowledge dynamics and organizational learning, the research investigates how AI-driven tools — such as explainable analytics, knowledge graphs, and human-in-the-loop systems — can enhance institutional knowledge flows and decision-making capabilities.

The paper positions AK as the convergence point between human cognition and machine intelligence, proposing that co-created knowledge can improve both the efficiency and transparency of criminal investigations. It also aligns this technological transformation with emerging governance frameworks, including the *EU Artificial Intelligence Act* and the *NIST AI Risk Management Framework*, ensuring responsible and accountable adoption. Ultimately, the purpose of this research is to articulate a coherent, ethically grounded model for integrating AI-enabled KM into contemporary policing and forensic practice.

LITERATURE REVIEW

This literature review synthesizes open-access and verifiable sources spanning KM in policing, AI in investigation and forensics, human–AI teaming, governance and ethics (EU AI Act, NIST AI RMF, HLEG), and convergent notions of AK. The objective is to ground a coherent conceptual and operational bridge between KM and AI for detecting and proving crime, while highlighting implications for evidentiary reliability, institutional learning, and cross-border cooperation.

KM in policing and criminal justice

Foundational KM research tailored to policing shows that law-enforcement agencies routinely generate and circulate both *tacit* (experience-based) and *explicit* (codified) knowledge, yet face structural barriers to capturing and reusing it at scale. Classic U.S. Department of Justice studies argued for treating frontline know-how as organizational intellectual capital and for integrating KM techniques into an interrelated system rather than isolated tools (e.g., after-action reviews, communities of practice, repositories) (Pendleton et al., 2001). These works emphasized leadership, culture, and workflow redesign to surface tacit insights and connect them to decision cycles. (Pendleton, Chavez, & Bueerman, 2001, pp. 1–3).

A systematic review of European studies (2000–2013) found research skewed toward intra-organizational sharing, criminal intelligence, and technology, with persistent impediments grouped into strategy/legislation, technology, culture, and knowledge loss; the review called for leadership attention and for bridging regional and institutional boundaries — an agenda that remains remarkably current (Griffiths et al., 2016).

Intelligence-Led Policing (ILP) codifies the KM–operations interface by linking information flows, analysis, and decision-making in a repeatable cycle. The OSCE ILP Guidebook sets out a process architecture (tasking, collection, evaluation, analysis, dissemination) and underscores legality, proportionality, and partnership working for knowledge exchange (OSCE, 2017). The United Nations DPO’s *Manual on Intelligence-Led Policing* updates this for peace operations, emphasizing human-rights-com-



pliant collection, structured analytical products, and institutional learning loops — principles directly translatable to domestic policing KM and to cross-agency cooperation (UN DPO, 2025).

Within KM theory, Brătianu and Bejinaru reconceptualize knowledge beyond “stock/flow” metaphors by introducing *knowledge fields* and *knowledge dynamics* via a thermodynamics lens: rational, emotional, and spiritual forms of knowledge transform into one another; managing the *transformational* dynamics (not merely storage and transfer) is the key to organizational learning and innovation (Brătianu & Bejinaru, 2019, 2020). This energetic view is valuable in policing, where morale, sense-making under stress, and values shape evidence interpretation as much as rules and databases.

Recent work specific to KM and AI integration maps the research frontier. A bibliometric analysis highlights rapid growth and fragmentation in the KM–AI nexus and calls for robust conceptual scaffolding and empirical validation in core KM processes (creation, sharing, use) (Brătianu & Ioan, 2025). Complementarily, a systematic review proposes a research agenda to reconcile the “technology-centric” and “human-centric” poles of KM through AI capabilities while cautioning that barriers and risks remain under-studied (Nakash & Bolisani, 2024).

AI for detection, triage, and proof

Law-enforcement agencies in the EU collectively report accelerating adoption of AI for pattern detection, multimedia triage, language technologies, and resource optimization — while confronting acute issues of data quality, bias, explainability, and capability gaps (Europol Innovation Lab, 2024). Eurojust and eu-LISA extend this picture to judicial cooperation: AI promises efficiency in mutual legal assistance and evidence analysis, but admissibility, transparency, and due-process safeguards require early design attention and governance alignment (Eurojust & eu-LISA, 2022).

The INTERPOL–UNICRI Toolkit offers an operational playbook for “responsible AI innovation” in law enforcement, from problem framing and data governance to evaluation and human oversight. It operationalizes abstract principles into procurement, piloting, and deployment checklists that can be embedded in agency KM procedures (INTERPOL & UNICRI, 2023). In parallel, the U.S. federal guidance underscores validation, measurement, and accountability in criminal-justice AI, calling out risks for civil liberties and recommending governance mechanisms to scrutinize models used in forensic and investigative contexts (U.S. DOJ, 2024).

At the technical layer, explainability and auditability are essential to bridge AI outputs with evidentiary standards. An open-access study shows how explainable AI (XAI) techniques can clarify intrusion-detection system inferences, improving analyst trust and making algorithmic reasoning auditable — an approach generalizable to many investigative models (Hermosilla et al., 2025). Likewise, knowledge graphs combined with ML have been demonstrated to structure investigative entities, relations, and provenance, thereby supporting insight discovery and transparent evidence linking (Iyengar et al., 2024).

Earlier U.S. NIJ work mapped AI opportunities across the justice chain — from video analytics to triage of digital evidence — and stressed co-design with practitioners and measurable benefit-risk trade-offs (Rigano, 2019). These practice-oriented lines complement the policy and governance literature, anchoring AI’s role not as a black box “oracle,” but as a decision-support layer embedded in KM workflows.

Human–AI teaming and the emergence of “artificial knowledge”

Two comprehensive surveys formalize *human-in-the-loop* (HITL) machine learning as a family of methods that systematically inject expert judgment into the model lifecycle (data curation, feature engineering, active learning, interactive labeling, post-hoc calibration), thereby improving performance,



safety, and acceptance in high-stakes domains (Wu et al., 2022; Wang, Guo, & Chen, 2022). From a socio-technical vantage, *team-centered AI* emphasizes role clarity, shared mental models, communication, and workload distribution in human–AI teams — critical to avoid automation bias and to ensure investigators retain agency over evidential reasoning (Hagemann, Kluge, & Zohren, 2023).

These developments converge with the AK concept. Brătianu and Bejinaru (2025) define AK as the product of AI systems — especially generative AI — coexisting with human knowledge within KM systems; they frame integration strategies that treat AK as complementary, not substitutive, with explicit attention to the different genesis and validation logics of human vs. machine outputs (Brătianu & Bejinaru, 2025). Brătianu (2025) further situates technology within societal and ethical ambits, arguing that managerial discernment, values, and foresight are needed to capture benefits without eroding human judgment or social trust.

A related strand explores *entropy-informed* perspectives: Mageed (2024) argues that entropy offers a unifying lens for uncertainty quantification in AI and for measuring *knowledge entropy* in organizations — useful for diagnosing where knowledge transfer (including intergenerational transfer) fails and where codification vs. personalization strategies should be prioritized (Mageed, 2024). Together, HITL, team-centered AI, AK, and entropy perspectives motivate a KM-first integration pattern: encode *who does what* (roles), *how knowledge flows* (process), and *how uncertainty is surfaced and reduced* (methods) so that AI outputs become auditable *knowledge objects* within the institution.

Ethical, legal, and risk-management frameworks

Three complementary governance anchors shape legitimate AI use in policing and justice: EU ethics guidance (HLEG), binding regulation (EU AI Act), and risk management frameworks (NIST AI RMF). The *Ethics Guidelines for Trustworthy AI* articulate seven requirements — human agency and oversight; technical robustness and safety; privacy and data governance; transparency; diversity, non-discrimination and fairness; societal/environmental well-being; and accountability — and provide an assessment list to operationalize them (HLEG, 2019). The *EU Artificial Intelligence Act* (Regulation (EU) 2024/1689) introduces a risk-tiered regime with obligations for high-risk systems, including risk management, technical documentation, data governance, logging, transparency, human oversight, and post-market monitoring; it also contains specific safeguards for certain law-enforcement uses (e.g., biometric identification) (European Parliament & Council, 2024).

The *NIST AI Risk Management Framework (AI RMF 1.0)*, although non-binding in the EU, is widely used as a practical scaffold. Its GOVERN–MAP–MEASURE–MANAGE functions align with ILP/KM cycles: governance policies and roles; context/impact mapping; measurement and evaluation (including bias, validity, security, and explainability); and risk treatment across the AI lifecycle (NIST, 2023). In law-enforcement contexts, adopting AI RMF-style profiles can harmonize procurement, testing, and deployment with the obligations of the EU AI Act while preserving traceability for evidentiary scrutiny.

Institution-specific guidance complements these frameworks. The INTERPOL–UNICRI Toolkit packages responsible-AI practices into checklists for problem definition, dataset audit, model assurance, and oversight — including community engagement and grievance mechanisms suited to sensitive policing deployments (INTERPOL & UNICRI, 2023). The Europol's analysis catalogues operational benefits and cautions and advocates shared EU competencies, training, and common testing facilities to reduce fragmentation (Europol Innovation Lab, 2024). Eurojust points to cross-border casework where AI can help with translation, classification, and prioritization but urges alignment with fair-trial rights and judicial independence (Eurojust & eu-LISA, 2022).



From artefacts to admissible knowledge

A recurring theme across technical and governance sources is the need to transform AI system outputs into *admissible knowledge objects* with provenance, context, and interpretability sufficient for courts and oversight bodies. Hermosilla et al. (2025) show that XAI can surface decision pathways and feature influences in IDS contexts; analogously, investigators can demand model cards, decision logs, and explanations in computer-vision or NLP systems used in digital forensics (Hermosilla et al., 2025). Knowledge-graph approaches help encode entities, relationships, and supporting evidence with timestamps and sources, making linkages auditable and falsifiable (Iyengar et al., 2024).

The EU AI Act documentation, logging, and human-oversight provisions directly support evidentiary defensibility, while HLEG's transparency and accountability requirements frame institutional duties to explain and justify (European Parliament & Council, 2024; HLEG, 2019). NIST's MAP/MEASURE activities recommend explicit identification of harms, impacted communities, and measurement strategies — inputs that can be mirrored in case files and disclosure packs (NIST, 2023). The U.S. DOJ report likewise recommends rigorous validation and auditing regimes tailored to justice applications — reinforcing that *model evidence* becomes *case evidence* only when governance, testing, and documentation close the gaps (U.S. DOJ, 2024).

Organizational capability building: culture, leadership, and learning loops

The shift from tools to knowledge systems is cultural as much as technical. The DOJ COPS volume underscored innovation leadership and the necessity to integrate KM techniques into a coherent system (Pendleton et al., 2001). The European systematic review urged leadership-driven strategies, procedural clarity, and training to build the motivation and skills for sharing (Griffiths et al., 2016). ILP handbooks (OSCE; UN DPO) illustrate how to embed knowledge capture and feedback in operational tasking cycles and to formalize analyst–operator dialogues that prevent siloing (OSCE, 2017; UN DPO, 2025).

In KM theory, treating knowledge as dynamic fields reframes capacity building as enabling *transformations* (e.g., from emotional to rational knowledge during briefings; from rational to spiritual knowledge when values and legitimacy are at stake) (Brătianu & Bejinaru, 2020). For AI integration, this supports interventions such as pre-mortems (to surface tacit concerns), red-team reviews (to stress-test models), and structured debriefs that explicitly translate experiential insights into dataset improvements and model governance artifacts — linking HITL practice (Wu et al., 2022; Wang et al., 2022) to KM outcomes.

Finally, strategic reflections on technology's societal role counsel prudence: capture AI's productivity and insight gains without allowing them to displace human judgment, professional ethics, or community trust. Managers must design KM strategies that preserve human agency while leveraging AK as a complementary asset (Brătianu, 2025; Brătianu & Bejinaru, 2025).

Toward an AI-enabled KM framework for detecting and proving crime

Across these sources, four design imperatives recur:

- *Legibility and auditability of AI-derived knowledge.* Use XAI, knowledge graphs, model documentation, and logging to convert AI outputs into evidentiary objects with provenance and context (Hermosilla et al., 2025; Iyengar et al., 2024; EU AI Act; HLEG; NIST).



- *HITL and team-centered operations.* Design workflows that institutionalize human oversight, feedback, and shared mental models to mitigate automation bias and support learning (Wu et al., 2022; Wang et al., 2022; Hagemann et al., 2023; INTERPOL–UNICRI).
- *KM-first integration.* Embed AI within ILP/KM cycles and organizational culture (tasking–collection–analysis–dissemination–review), aligning with DOJ COPS guidance, OSCE/UN DPO ILP, and Europol/Eurojust recommendations for cross-border contexts (Pendleton et al., 2001; OSCE, 2017; UN DPO, 2025; Europol, 2024; Eurojust & eu-LISA, 2022).
- *Conceptual coherence.* Adopt thermodynamics-based KM (knowledge fields/dynamics), entropy-informed uncertainty management, and AK as the human–machine synthesis layer — ensuring AI augments, rather than substitutes, professional judgment (Brătianu & Bejinaru, 2019, 2020, 2025; Mageed, 2024; Brătianu & Ioan, 2025; Nakash & Bolisani, 2024).

Together, these strands justify an integrated *AI-enabled KM framework* for modern investigations: (i) governed by ethics, law, and risk controls (HLEG; EU AI Act; NIST), (ii) operationalized through ILP/KM processes and cross-border cooperation (OSCE; UN DPO; Europol; Eurojust), (iii) tooled with explainable, knowledge-graph-aware analytics (Hermosilla et al.; Iyengar et al.), and (iv) sustained by human–AI teaming practices and learning loops that cultivate AK as a traceable, admissible, and *useful* addition to institutional memory (Wu et al.; Wang et al.; Hagemann et al.; Brătianu & Bejinaru; Brătianu & Ioan; Nakash & Bolisani).

DESIGN/METHODS/APPROACH

The methodological design of this study follows a qualitative, interpretive research strategy aimed at exploring how the integration of KM and AI can address contemporary challenges in detecting and proving crime. Given the conceptual nature of the topic and the extensive availability of recent scholarly and institutional sources, a systematic qualitative document analysis (QDA) was employed. This approach allows the extraction, comparison, and synthesis of theoretical constructs, operational principles, and policy implications across multiple open-access publications, reports, and regulatory documents.

Research design

The study adopts an exploratory-descriptive design, intended to map and interpret relationships among three central constructs — *Knowledge Management*, *Artificial Intelligence*, and *Artificial Knowledge* — within the broader framework of criminal investigation and forensic evidence management. The investigation relies on secondary qualitative data, consisting exclusively of peer-reviewed articles, institutional manuals, international frameworks, and policy documents published between 2017 and 2025. This design aligns with prior interpretive KM research that privileges conceptual depth and contextual understanding over statistical generalization (Brătianu & Bejinaru, 2019; Nakash & Bolisani, 2024).

Data selection and analysis

A purposive sampling strategy was applied to identify documents that explicitly discuss:

- the role of KM in law enforcement or intelligence-led policing,
- the application of AI or machine learning in criminal justice, and
- theoretical or ethical frameworks addressing the human–AI knowledge interface.

Thirty open-access sources meeting these criteria were selected. They include academic journal articles, institutional manuals (e.g., OSCE, UN DPO, NIST), policy frameworks (e.g., EU AI Act, Ethics



Guidelines for Trustworthy AI), and technical or methodological studies (e.g., explainable AI, human-in-the-loop learning). Each document was reviewed in full to ensure relevance, credibility, and methodological transparency.

The qualitative analysis combined directed content analysis and conceptual synthesis:

Thematic coding. Text segments were coded using three overarching categories derived from the research objectives:

- *KM and organizational learning in law enforcement;*
- *AI applications and forensic investigation challenges;* and
- *Convergence through AK and human–AI teaming.*

Subcodes captured recurring patterns such as knowledge flows, explainability, human oversight, data governance, and evidentiary traceability.

Iterative interpretation. Through repeated reading and cross-document comparison, recurring theoretical propositions were identified — such as the complementarity of tacit and explicit knowledge (Brătianu & Bejinaru, 2020), or the need for explainable and auditable AI (Hermosilla et al., 2025; Iyengar et al., 2024). Concepts were then clustered into higher-order analytical themes that shaped the structure of the literature review and findings sections.

Triangulation. To ensure interpretive validity, insights were cross-checked between distinct document types (academic, regulatory, technical). For example, the *Ethics Guidelines for Trustworthy AI* (2019) and *Regulation (EU) 2024/1689* were juxtaposed with empirical analyses of policing practices (Europol, 2024; UN DPO, 2025) to derive consistent principles applicable to evidentiary contexts.

Analytical framework

The analytical process was guided by an integrative framework combining:

- *Knowledge dynamics theory* (Brătianu & Bejinaru, 2019, 2020), emphasizing transformational flows of knowledge;
- *Human-in-the-loop and team-centered AI models* (Wang et al., 2022; Hagemann et al., 2023), illustrating co-creation of AK; and
- *Governance and risk frameworks* (NIST, 2023; European Parliament & Council, 2024) that ensure legal and ethical compliance.

The synthesis of these dimensions enabled the formulation of a conceptual model situating AI-enabled KM within the investigative cycle — from intelligence collection and analysis to decision-making and evidentiary validation.

Methodological limitations

As a qualitative conceptual inquiry, this study does not include quantitative metrics or statistical validation. The conclusions rely on interpretive reasoning and triangulation rather than numerical generalization. Nevertheless, this approach provides depth, conceptual clarity, and policy relevance, laying a rigorous foundation for subsequent empirical validation through case studies or field applications in law-enforcement settings.



Ethical and quality considerations

All analysed materials were open-access or publicly available sources, ensuring compliance with academic integrity and intellectual property standards. Analytical transparency was maintained through systematic referencing, traceable citations, and alignment with recognized frameworks for qualitative research credibility — namely, dependability, confirmability, and transferability.

FINDINGS

The qualitative analysis of open-access academic and institutional sources revealed converging insights on how KM and AI can jointly enhance the detection and proof of crime. The results demonstrate that the effective integration of AI into law-enforcement knowledge ecosystems depends on (1) the maturity of organizational KM processes, (2) the degree of transparency and explainability embedded in AI systems, and (3) the establishment of ethical and regulatory safeguards ensuring human oversight and evidentiary integrity.

Table 1 below synthesizes the main conceptual contributions derived from the reviewed literature. Each thematic cluster reflects one of the three analytical axes of the study — *KM Foundations*, *AI and Forensic Innovation*, and *AK Convergence* — cross-referenced with key frameworks and representative sources.

Table 1: *Synthesis of Key Findings from the Qualitative Document Analysis*
(source: Author's processing)

Thematic Cluster	Key Insights	Sources
KM in Law Enforcement	KM processes such as knowledge capture, sharing, and reuse remain fragmented across institutions. Tacit knowledge and experiential learning are undervalued but essential for intelligence analysis and operational coordination. ILP frameworks operationalize KM principles through the intelligence cycle (tasking–collection–analysis–dissemination–review).	Pendleton et al. (2001); Griffiths et al. (2016); OSCE (2017); UN DPO (2025)
Dynamic Knowledge Transformations	Knowledge behaves as an energy-like field undergoing transformations between rational, emotional, and spiritual states; effective KM strategies must facilitate these conversions to enable innovation and adaptive learning.	Brătianu & Bejinaru (2019, 2020); Brătianu (2025)
Integration of KM and AI	AI extends KM capabilities from data storage to semantic reasoning, predictive modeling, and decision support. Empirical gaps persist in validating these systems within law enforcement.	Brătianu & Ioan (2025); Nakash & Bolisani (2024)
AI for Crime Detection and Evidence Analysis	AI systems improve speed, precision, and pattern recognition in investigations but require human interpretive oversight to maintain accountability and admissibility.	Europol (2024); Eurojust & eu-LISA (2022); Rigano (2019)
Explainable and Auditable AI	Explainable AI (XAI) and knowledge graphs transform opaque algorithmic results into transparent, auditable evidence, supporting judicial scrutiny and chain of custody.	Hermosilla et al. (2025); Iyengar et al. (2024)



Thematic Cluster	Key Insights	Sources
Human–AI Collaboration	Human-in-the-loop and team-centered AI models demonstrate that the most reliable systems retain human agency for contextual judgment, bias correction, and situational awareness.	Wu et al. (2022); Wang et al. (2022); Hagemann et al. (2023)
AK as Convergence	AK represents the synthesis between human cognition and machine-generated insights; it is validated through interaction, not automation.	Brătianu & Bejinaru (2025); Mageed (2024)
Ethical and Legal Alignment	Trustworthy AI in policing requires adherence to risk-based governance (AI Act), ethical principles (HLEG), and documented accountability mechanisms (NIST AI RMF).	European Parliament & Council (2024); HLEG (2019); NIST (2023)
Organizational Learning and Change Management	Successful AI–KM integration depends on leadership commitment, inter-agency learning loops, and a culture that values transparency, documentation, and cross-domain collaboration.	Griffiths et al. (2016); UN DPO (2025); INTERPOL & UNICRI (2023)

Emerging Patterns

Three dominant patterns emerged from the analysis (Figure 1):

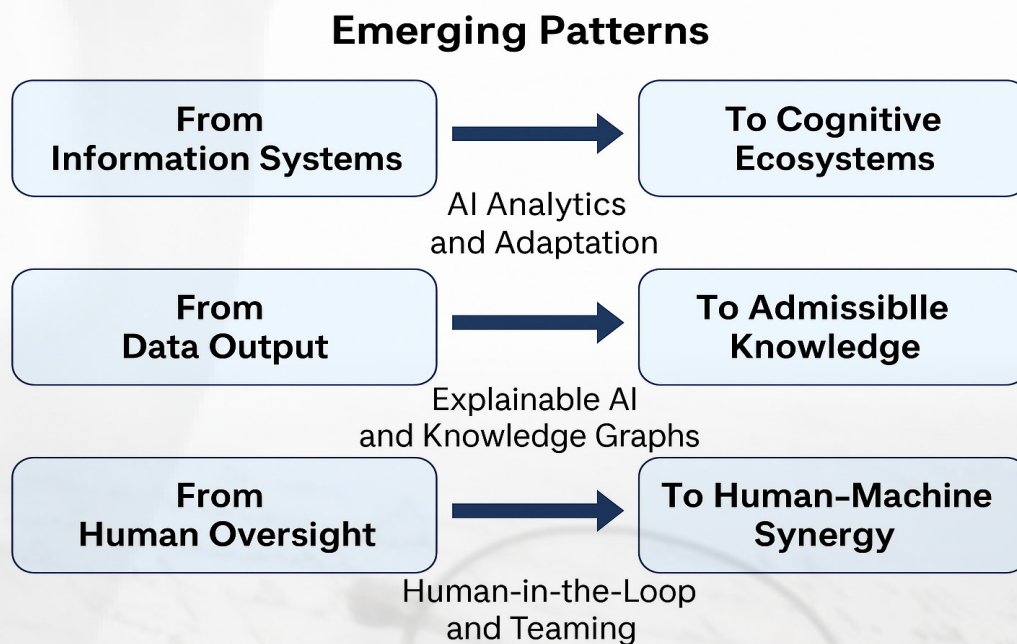


Figure 1: *Emerging Patterns* (source: Author's processing)

From Information Systems to Cognitive Ecosystems. The integration of AI transforms KM infrastructures into *cognitive ecosystems* where human expertise, digital records, and algorithmic analytics co-exist. Traditional KM tools (databases, reports, after-action reviews) evolve into interactive, adaptive systems capable of detecting patterns and generating hypotheses in near real time (Brătianu & Ioan, 2025; Nakash & Bolisani, 2024).



From Data Output to Admissible Knowledge. The distinction between *data*, *information*, and *knowledge* becomes legally and operationally critical. Explainable AI and knowledge graphs enable the transformation of machine outputs into structured, traceable, and evidentiary knowledge artifacts (Hermosilla et al., 2025; Iyengar et al., 2024). This evolution supports judicial standards of transparency and reproducibility under the EU AI Act (2024).

From Human Oversight to Human–Machine Synergy. Human involvement shifts from reactive oversight to proactive co-creation of knowledge. Human-in-the-loop and team-centered AI frameworks (Wu et al., 2022; Hagemann et al., 2023) demonstrate that when human experts guide data interpretation and contextualization, algorithmic accuracy and trustworthiness increase substantially. In policing, this manifests as analyst–AI collaboration where investigators validate, annotate, and recontextualize system outputs within institutional KM systems.

The AI-Enabled KM Cycle

To visualize the integration between KM and AI within law enforcement workflows, the study proposes the conceptual model “AI-Enabled KM Cycle for Criminal Investigation” (Figure 2).

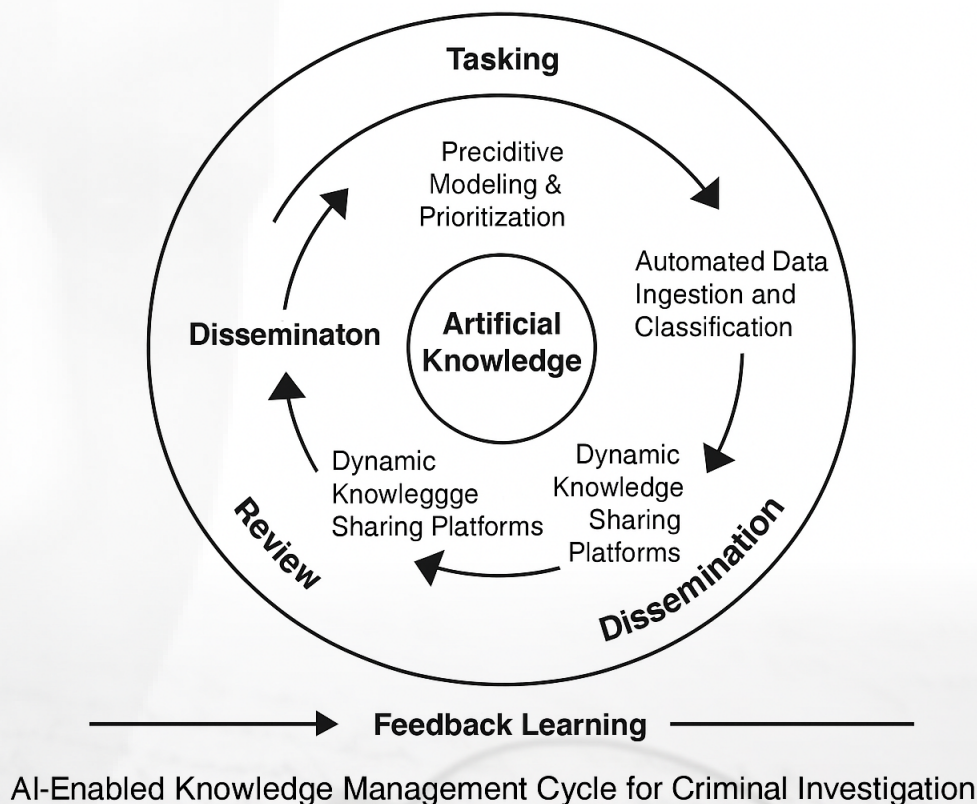


Figure 2: *AI-Enabled KM Cycle for Criminal Investigation* (source: Author’s processing)

The model is represented as a cyclic, five-phase framework reflecting continuous learning and feedback between human and machine actors.

The outer cycle mirrors the *intelligence-led policing* structure (Tasking → Collection → Analysis → Dissemination → Review).

The inner cycle embeds AI-driven processes that augment each stage:

- *Tasking* → predictive modeling & prioritization (AI analytics support resource allocation).
- *Collection* → automated data ingestion and classification (AI assists in capturing and structuring knowledge).



- *Analysis* → hybrid reasoning (human + AI co-analysis via knowledge graphs and XAI tools).
- *Dissemination* → dynamic knowledge sharing platforms (KM systems updated with validated insights).
- *Review* → feedback learning (results fed back into AI models for retraining and into KM systems for organizational learning).

A feedback arrow connects *Review* to *Tasking*, symbolizing the learning loop and the emergence of AK — the shared, validated, and evolving knowledge space that fuses human judgment and AI insight.

This cyclical model illustrates the dual transformation identified in the findings: (1) AI enhances the operational intelligence cycle by automating data-intensive tasks, and (2) KM ensures that insights — human or machine — are institutionalized, ethically governed, and legally defensible.

Consolidated Interpretation

The integration of AI and KM in law enforcement represents not merely a technological modernization, but a paradigm shift from reactive data management to proactive knowledge creation. Key implications include:

Efficiency and Accuracy: AI-supported KM accelerates investigative processes while improving accuracy through automated data correlation and anomaly detection (Europol, 2024).

Transparency and Accountability: Embedding explainability and governance frameworks (HLEG, 2019; NIST, 2023) ensures that AI-generated insights can withstand judicial scrutiny.

Institutional Learning: Knowledge captured through ILP and KM systems fosters organizational memory, reducing repetition of past errors and enabling rapid adaptation in crisis situations (UN DPO, 2025).

Ethical Safeguards: Compliance with the EU AI Act (2024) and the Ethics Guidelines for Trustworthy AI protects against discriminatory practices, ensuring proportionality and respect for fundamental rights.

Human–Machine Synergy: The emergence of AK confirms that value is maximized not when AI replaces human expertise, but when it complements and extends it within an ethical, transparent KM ecosystem (Brătianu & Bejinaru, 2025).

The synthesis of qualitative evidence supports the argument that AI-enabled KM enhances both operational capability and evidentiary integrity in modern law enforcement. The transition from data-centric to knowledge-centric systems — governed by ethical frameworks and reinforced through human–AI collaboration — creates a resilient, transparent, and adaptive foundation for detecting and proving contemporary forms of crime.

ORIGINALITY/VALUE

This paper contributes a novel, integrative perspective on the intersection between KM and AI within the context of contemporary criminal investigation. Its originality lies in bridging conceptual, operational, and ethical dimensions that have traditionally been studied in isolation. By synthesizing insights from thirty-one open-access academic and institutional sources, the study constructs a coherent framework demonstrating how AI can transform KM from a repository-centered practice into a *dynamic, cognitive ecosystem* for law enforcement.

Unlike previous research that emphasized either technological innovation or organizational reform, this study positions AK — the emergent fusion of human expertise and machine intelligence — as a



third knowledge domain. Within this paradigm, AI is not merely an analytical tool but an epistemic partner contributing to the creation, validation, and institutionalization of knowledge relevant to the detection and proof of crime.

The paper further advances scholarly discourse by translating theoretical constructs such as knowledge fields and knowledge dynamics (Brătianu & Bejinaru, 2020) into a law-enforcement setting, integrating them with explainable AI, human-in-the-loop frameworks, and the ethical governance structures defined by the EU AI Act (2024) and NIST AI RMF (2023). The resulting model — the *AI-Enabled KM Cycle for Criminal Investigation* — provides an actionable template for agencies seeking to balance efficiency, accountability, and human oversight.

Practically, the research offers policymakers and law-enforcement leaders a roadmap for responsibly embedding AI into investigative processes without compromising evidentiary integrity or legal proportionality. Academically, it enriches the limited literature connecting KM theory, forensic science, and AI ethics. Conceptually, it reframes crime detection as a process of *knowledge creation* governed by transparency, collaboration, and adaptive learning — a significant step toward operationalizing trustworthy, AI-augmented intelligence in the criminal justice domain.

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CAN FURANOCOUMARINS BECOME THE NEW PLATFORM FOR HIGH-ENERGY MATERIALS?

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ABSTRACT

Purpose: Furanocoumarins such as angelicin and psoralen, modified by the introduction of nitro groups, were investigated as potential high-energy materials (HEMs). Their structure has been recognized as a suitable basis for the development of new explosive compounds. In the research of high-energy materials, reducing the risk of explosion is desirable, which has led to the use of computational tools for investigating structure–property relationships and designing advanced HEMs by predicting key parameters such as stability and detonation performance prior to synthesis.

Design/Methods/Approach: In this paper, a computational research approach has been applied, which includes molecular modeling, quantum chemical calculations, and comparative analysis of energetic and stability parameters.

Findings: Key properties for the evaluation of the modified furanocoumarin explosives were the detonation velocity and detonation pressure, estimated using the Kamlet–Jacobs equations. DFT methods provided reliable molecular geometries and electronic parameters necessary for the prediction of energetic performance. The obtained results showed that the detonation characteristics of nitro-substituted furanocoumarins are comparable to those of conventional commercial explosives, highlighting their potential as promising candidates for further development.

Originality/Value: In this paper, nitro-substituted furanocoumarins are investigated as potential high-energy compounds, and their properties are compared with those of commercial explosives. The study provides insights into the structural modification of furanocoumarins for the development of energetic materials and lays the foundation for future research.

Keywords: Furanocoumarins, HEM, detonation parameters, molecular modeling

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INTRODUCTION

Coumarins (2H-1-benzopyran-2-ones), according to their chemical structure, belong to the subgroup of lactones and constitute a large class of phenolic derivatives (Hung, Suh, & Wang, 2017). Their structure consists of a benzene ring fused with an α -pyrone ring, forming a π - π conjugated system rich in electrons, which provides good charge delocalization properties (Kontogiorgis et al., 2012; Nikhil et al., 2012). Most compounds are oxygenated at the C-7 position and often contain isoprenoid chains bound to carbon, oxygen, or both. Based on their structural features, coumarins are classified as: (I) simple coumarins, (II) furanocoumarins, (III) pyranocoumarins, or (IV) coumarins substituted on the pyrone ring, including their hydroxylated, alkoxyated, and alkylated derivatives, as well as their glycosides (Del Río et al., 2014). Coumarins are most frequently found in fruits, but also occur in roots, stems, and leaves. Their biosynthesis takes place through the shikimate and phenylpropanoid pathways, with cinnamic acid serving as the key precursor (Eisenbrand, 2007; Scott et al., 1976).



Furanocoumarins represent a specific subgroup of coumarins, formed by the fusion of a furan ring with the benzopyran core, resulting in angular (e.g., angelicin) or linear (e.g., psoralen) isomers depending on the position of the furan ring (Chen et al., 2014; Dugrand-Judek et al., 2015). These compounds, predominantly found in the Apiaceae, Rutaceae, Moraceae, and Leguminosae families, are synthesized by plants as an adaptation to biotic and abiotic stress, particularly as a defense against insects, fungi, and bacteria (Fracarolli et al., 2016; Raunio et al., 2020). Furanocoumarins display a wide range of biological activities, including antioxidant, antimicrobial, anti-inflammatory, analgesic, and even anticancer properties, and are therefore recognized as promising therapeutic agents (Melough et al., 2018). Some compounds from this group have also shown the ability to inhibit the growth of phytopathogenic microorganisms, making them attractive as natural pesticides in agriculture (Fracarolli et al., 2016; Raunio et al., 2020).

Nevertheless, in addition to their usefulness, coumarins – and furanocoumarins in particular – may cause undesirable and potentially harmful effects. Of particular importance are the phototoxic effects of linear furanocoumarins such as psoralen, which, in interaction with human skin and UV radiation, can lead to photosensitization, allergic reactions, and potential carcinogenicity. Furthermore, furanocoumarins can interfere with drug metabolism through the inhibition of cytochrome P450, which makes them highly relevant in the context of drug interactions. (Chen et al., 2014)

Although furanocoumarins are mainly studied for their pharmacological and ecological properties, their structural features – a rigid aromatic system with potential for further functionalization – also make them interesting candidates for applications beyond biomedicine. In particular, the combination of aromatic stability and electron-rich conjugation is a desirable characteristic in the design of high-energy materials (HEMs). In recent decades, both the diversity and production volume of high-energy materials (HEMs) have increased substantially. While superior performance has always been a primary requirement, catastrophic detonations have highlighted the urgent need for explosives with improved thermal stability and reduced sensitivity to external stimuli such as shock or friction (Sikder & Sikder, 2004; Mathieu, 2017). Hazards associated with these substances can arise in various contexts, including accidents during transport, incidents in laboratories or industrial processes, and natural disasters such as earthquakes and typhoons (Tasić et al., 2021). To address these challenges, researchers have increasingly relied on computational tools to investigate the relationship between molecular structure and explosive properties. Such approaches have facilitated the design of new energetic compounds that combine high performance with lower sensitivity. Reliable computational methods not only allow safer handling of energetic molecules but also provide valuable insights into the structural factors governing their sensitivity and stability (Türker & Variş, 2009).

With more than 1,300 coumarins identified and an increasing number of studies confirming both their pharmacological potential and toxicological challenges, coumarins remain one of the most extensively investigated classes of natural compounds in phytochemistry and biomedicine. In this study, we focused on exploring a novel aspect of furanocoumarins – their potential application as new types of high-energy materials. Particular attention was given to psoralen and angelicin derivatives, into whose structures nitro groups were incorporated, resulting in a significant enhancement of their energetic performance. The selection of these compounds was based on the fact that molecules with a higher number of aromatic rings often exhibit increased thermal stability and resistance to external influences, making them suitable candidates for the development of new high-energy materials. (Veljković et al., 2021)



METHODOLOGY

All quantum chemical calculations for the investigated molecular systems were carried out using the Gaussian 09 software package. The B3LYP functional (Becke, three-parameter, Lee–Yang–Parr), one of the most widely employed hybrid density functional theory (DFT) methods, was chosen due to its proven balance between accuracy and efficiency. Numerous studies (Maslovara et al., 2019; Ječmenica Dučić et al., 2023) have demonstrated that DFT methods, and B3LYP in particular, yield reliable molecular geometries while demanding significantly less computational time and resources compared to more advanced post-Hartree–Fock methods. For geometry optimization, the correlation-consistent polarized valence double-zeta (cc-PVDZ) basis set developed by Dunning was applied, ensuring a good compromise between computational cost and accuracy of the obtained structural parameters. The initial molecular geometries were constructed using ArgusLab (ArgusLab, n.d.) and subsequently fully optimized in Gaussian 09 (G09 | Gaussian.Com, n.d.), where vibrational frequency analyses confirmed the absence of imaginary frequencies, indicating that the optimized structures correspond to true minima on the potential energy surface.

The Kamlet–Jacobs equations have long been recognized as one of the most reliable semi-empirical tools for estimating detonation parameters of energetic materials. Numerous studies (Politzer & Murray, 2011, 2014a) have demonstrated their good agreement with experimental data, which makes them particularly important in the design and theoretical evaluation of new explosive compounds.

According to the original formulation of Kamlet and Jacobs, the detonation pressure is defined as:

$$P_{det} = \rho_0 DW + P_1 \quad (1)$$

where ρ_0 is the initial density of the explosive, D the detonation velocity, W the particle velocity, and P_1 the initial pressure of the explosive. In practice, P_1 is negligible compared to P_{det} . These equations were initially derived for CHNO-type explosives, i.e., compounds containing carbon, hydrogen, nitrogen, and oxygen.

The key factor influencing detonation velocity and pressure is expressed through the Kamlet–Jacobs parameter φ (Politzer & Murray, 2019):

$$\varphi = NM^{0.5}Q^{0.5} \quad (2)$$

Here, N is the number of moles of gaseous detonation products per gram of explosive, Q is the heat of detonation in cal/g, and M represents the average molecular weight of the gaseous products. Using this parameter, the detonation pressure and velocity can be estimated as:

$$P = K\rho_0^2\varphi \quad (3)$$

$$D = A\varphi^{0.5} \varphi (1+B\rho_0) \quad (4)$$

where A , B , and K are empirical constants. The final, most widely used form of these equations is given as (Politzer & Murray, 2019):

$$P(\text{kbar}) = 15.58[NM^{0.5}Q^{0.5}\rho^2] \quad (5)$$

$$D(\text{km/s}) = 1.01[M^{0.5}N^{0.25}Q^{0.25}(1 + 1.30\rho)] \quad (6)$$

To calculate N , M , and Q , it is first necessary to predict the composition of detonation products. The detonation reaction involves multiple equilibria that typically yield gaseous species such as N_2 , CO_2 , CO , H_2O , H_2 , and solid carbon (Politzer & Murray, 2016, 2017). The actual product distribution, however, depends on factors such as initial density, temperature, and confinement. Several empirical rules have been proposed for product prediction, including the Kistiakowsky–Wilson, modified Kis-



tiakowsky–Wilson, and Springall–Roberts methods. Among these, the Kamlet–Jacobs rules are most frequently used (Politzer & Murray, 2014b). They predict formation of N_2 , CO_2 , C , H_2O , while oxygen is assumed to preferentially generate water rather than carbon dioxide. These rules do not predict the formation of (Politzer & Murray, 2016, 2019).

Interestingly, deviations in the assumed product composition have been shown to have little effect on the calculated values of D and P . This is attributed to compensating (balancing) effects, although these do not apply to the individual parameters N , M , and Q , which can vary significantly. For loading densities close to those of the pure crystals, the Kamlet–Jacobs rules typically provide results for D and P that are in somewhat better agreement with experimental data than those obtained from other rules (Politzer & Murray, 2016).

Nowadays, a variety of computer codes are available for direct calculation of detonation parameters. In the present study, we employed the “online molecular modeling platform and resources for atomistic calculations” (Armaković & Armaković, 2023), which allows automated prediction of the necessary thermodynamic quantities and detonation parameters.

RESULTS AND DISCUSSION

The obtained results for five psoralen derivatives are presented in **Table 1** and include the detonation parameters – detonation velocity (D), detonation pressure (P), and the heat of explosion (Q).

Table 1: Calculated detonation parameters – detonation velocity (D), detonation pressure (P), and heat of explosion (Q) – for nitro derivatives of psoralen.

Compound	$D(m/s)$	$P(kbar)$	$Q(g/mol)$
3',4,8-trinitropsoralen	7739.69	275.13	1528.45
3',4,5,8-tetranitropsoralen	8609.84	353.27	1690.56
3',5,8-trinitropsoralen	7870.21	283.11	1673.81
5,8-dinitropsoralen	7803.45	279.68	1579.42
4,5,8-trinitropsoralen	6774.62	200.22	1398.40

The analysis shows that the detonation velocity ranges from 6774,62 m/s (4,5,8-trinitropsoralen) to 8609,84 m/s (3',4,5,8-tetranitropsoralen). 3',4,5,8-tetranitropsoralen exhibits the highest D value, which is consistent with its maximum heat of explosion ($Q = 1690,56$ g/mol) and the highest detonation pressure ($P = 353,27$ kbar). This indicates a clear correlation between the released energy, the energy density of the system, and the ability of the compound to achieve higher detonation performance. On the other hand, 4,5,8-trinitropsoralen displays the lowest values of all parameters ($D = 6774,62$ m/s, $P = 200,22$ kbar, $Q = 1398,40$ g/mol), making it the least efficient compared to the other derivatives. The remaining compounds (3',4,8-trinitropsoralen, 3',5,8-trinitropsoralen, and 5,8-dinitropsoralen) show similar detonation velocities (7800–7900 m/s) and detonation pressures (275–283 kbar), with Q values ranging from 1528 to 1673 g/mol. This group demonstrates uniform performance, suggesting that they share similar structural factors influencing their detonation mechanism. Overall, the results confirm that even slight structural modifications of psoralen derivatives can significantly affect their detonation parameters. 3',4,5,8-tetranitropsoralen stands out as the compound with the most favorable properties, while 4,5,8-trinitropsoralen exhibits substantially weaker performance. The observed trends are consistent with literature reports, which emphasize that an increase in the heat of explosion directly contributes to higher detonation velocity and pressure.



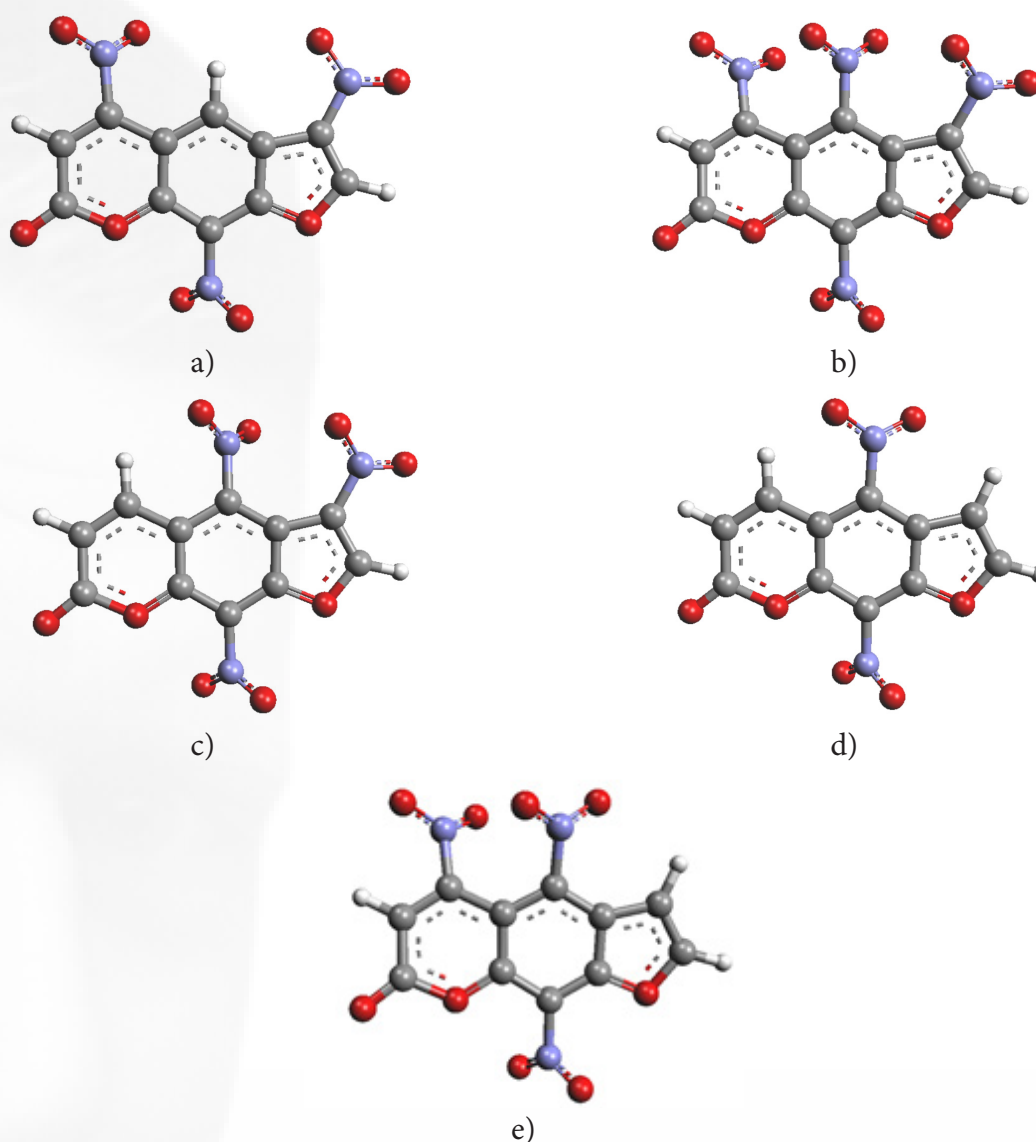


Figure 1: a) 3',4,8-trinitropsoralen; b) 3',4,5,8-tetranitropsoralen; c) 3',5,8-trinitropsoralen; d) 5,8-dinitropsoralen; e) 4,5,8-trinitropsoralen.

For the series of nitro derivatives of angelicin, the key detonation characteristics were calculated, and the values are presented in **Table 2**.

Table 2: Calculated detonation parameters – detonation velocity (*D*), detonation pressure (*P*), and heat of explosion (*Q*) – for nitro derivatives of angelicin

Compound	D(m/s)	P(kbar)	Q(g/mol)
3',4,6-trinitroangelicin	7795.09	275.68	1670.21
3',4,5,6-tetranitroangelicin	8606.69	353.017	1688.81
3',4,5- trinitroangelicin	7774.76	277.62	1556.34
3'5-dinitroangelicin	6757.13	199.18	1384.02

The most pronounced performance is exhibited by 3',4,5,6-tetranitroangelicin, with the highest detonation velocity (8606.69 m/s) and pressure (353.02 kbar), along with an almost maximum heat of

explosion (1688.81 g/mol). These parameters indicate the significant potential of this derivative compared to the others in the series. In contrast, 3'5-dinitroangelicin displays clearly the weakest characteristics ($D = 6757.13$ m/s; $P = 199.18$ kbar; $Q = 1384.02$ g/mol), confirming that this derivative is energetically less favorable. 3',4,6-trinitroangelicin and 3',4,5-trinitroangelicin occupy an intermediate position – their D and P values (approximately 7775–7795 m/s and 275–278 kbar) suggest a balanced level of stability and explosive power, while their Q values differ to a lesser extent (1556–1670 g/mol). Overall, the results confirm that nitro substitution in angelicin can significantly influence the detonation parameters. Two extremes are clearly distinguished – 3',4,5,6-tetranitroangelicin as the most energetic and 3'5-dinitroangelicin as the least efficient – while the remaining derivatives demonstrate balanced values.

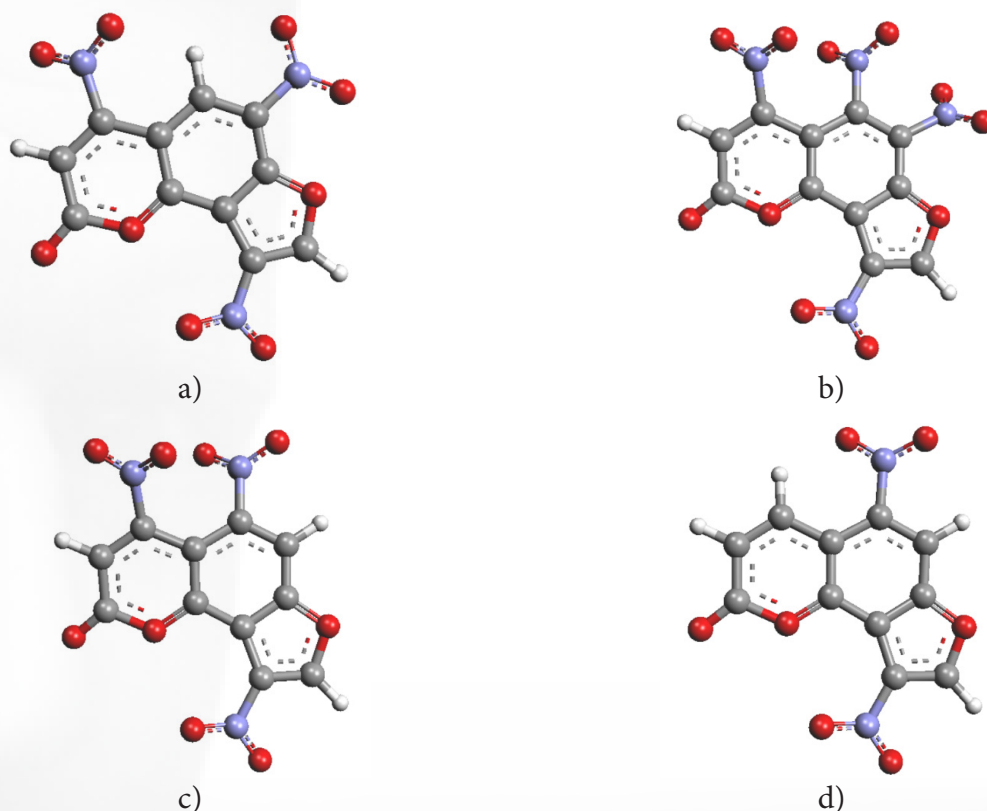


Figure 2: a) 3',4,6-trinitroangelicin; b) 3',4,5,6-tetranitroangelicin; c) 3',4,5-trinitroangelicin; d) 3'5-dinitroangelicin

The results show that both psoralen and angelicin derivatives exhibit a similar range of detonation parameters, although certain differences are observed among individual compounds. When the two series are compared, it is evident that psoralens and angelicins share very similar maximum and minimum values, indicating that both types of compounds display comparable energetic potentials. It is particularly interesting that 3',4,5,8-tetranitropsoralen and 3',4,5,6-tetranitroangelicin achieve almost identical values of D and P , while the least efficient derivatives (4,5,8-trinitropsoralen and 3'5-dinitroangelicin) record similarly lower parameters. This suggests that the fundamental difference between the two classes lies not in the extreme values, but rather in the internal distribution and consistency of the parameters. In general, it can be concluded that psoralens are somewhat more widely dispersed in their values (from 6774 to 8609 m/s), while angelicins show a slightly narrower interval (6757–8606 m/s). Nevertheless, both sets of compounds confirm that nitro substitution has a decisive influence on

detonation characteristics and that even minor structural variations can lead to significant differences in performance.

TOTAL ELECTRONIC ENERGY OF A MOLECULE

Table 3: *Calculated total energies (Eh) for nitro derivatives of psoralen*

Compound	Energy (Eh)
3',4,8-trinitropsoralen	-1.46E+11
3',4,5,8-tetranitropsoralen	-1.47E+11
3',5,8-trinitropsoralen	-1.26E+11
5,8-dinitropsoralen	-1.06E+11
4,5,8-trinitropsoralen	-1.26E+11

The obtained total energy values for psoralen derivatives clearly indicate differences in stability and potential explosive properties. The most negative energy was recorded for 3',4,5,8-tetranitropsoralen ($-1.47\text{E}+11$ Eh), confirming that this derivative possesses the most stable molecular structure. This finding is in good agreement with previous analyses of detonation parameters, according to which 3',4,5,8-tetranitropsoralen showed the highest detonation velocity and pressure, as well as the greatest released heat of explosion. Very close is 3',4,8-trinitropsoralen ($-1.46\text{E}+11$ Eh), indicating that both derivatives belong to the group of the most favorable ones in terms of stability and energetic efficiency. At the opposite end is 5,8-dinitropsoralen, with the highest energy ($-1.06\text{E}+11$ Eh), which points to the least favorable configuration and weak stability. This corresponds to its modest detonation performance. 3',5,8-trinitropsoralen and 4,5,8-trinitropsoralen share identical energy values ($-1.26\text{E}+11$ Eh), placing them in the middle of the series, with moderate stability and balanced energetic potential.

Table 4: *Calculated total energies (Eh) for nitro derivatives of angelicin*

Compound	Energy (Eh)
3',4,6-trinitroangelicin	-1.26E+11
3',4,5,6-tetranitroangelicin	-1.47E+11
3',4,5- trinitroangelicin	-1.6E+11
3'5-dinitroangelicin	-1.06E+11

The obtained total energy values for the series of angelicin derivatives show clear differences that can be correlated with the stability and potential energetic performance of the compounds. The lowest (most negative) energy is observed for 3',4,5,6-tetranitroangelicin ($-1.47\text{E}+11$ Eh), indicating the most stable configuration among the investigated derivatives. This is consistent with the results, where 3',4,5,6-tetranitroangelicin has already been identified as the derivative with the highest detonation velocity and pressure, as well as nearly maximal heat of explosion. Thus, the molecular stability is directly reflected in its energetic efficiency. In contrast, 3'5-dinitroangelicin exhibits the highest energy ($-1.06\text{E}+11$ Eh), which indicates a less favorable structure and lower stability. This also corresponds to the calculated detonation parameters, where 3'5-dinitroangelicin shows the weakest performance. 3',4,6-trinitroangelicin and 3',4,5- trinitroangelicin have similar energy values ($-1.26\text{E}+11$ Eh), confirming their comparable stability and balanced detonation characteristics. These results suggest that structural variations within the series of derivatives can lead to significant differences in total energies and, consequently, in the energetic performance of the compounds.



By comparing the energy values of the nitro derivatives of psoralen and angelicin (Tables 3 and 4), it can be concluded that the most stable molecules in both series are the second derivatives (3',4,5,8-tetranitropsoralen and 3',4,5,6-tetranitroangelicin), which show the most negative energy values ($-1.47\text{E}+11$ Eh). Conversely, the least stable compounds are 5,8-dinitropsoralen and 3'5-dinitroangelicin, characterized by the highest energy values ($-1.06\text{E}+11$ Eh). The remaining derivatives (3',4,8-trinitropsoralen, 3',5,8-trinitropsoralen, 4,5,8-trinitropsoralen, 3',4,6-trinitroangelicin, and 3',4,5-trinitroangelicin) exhibit intermediate energy values, indicating moderate stability and balanced energetic potential.

CONCLUSION

This study explored the potential of nitro-substituted furanocoumarins, specifically psoralen and angelicin derivatives, as novel high-energy materials (HEMs). Quantum chemical calculations combined with the Kamlet–Jacobs equations provided key insights into their detonation parameters and total electronic energies.

The results demonstrated that both psoralen and angelicin derivatives exhibit detonation velocities and pressures comparable to conventional explosives. Among the investigated compounds, 3',4,5,8-tetranitropsoralen and 3',4,5,6-tetranitroangelicin were identified as the most stable and energetically efficient derivatives, characterized by the lowest electronic energies and the highest detonation parameters. Conversely, 5,8-dinitropsoralen and 3'5-dinitroangelicin showed the least favorable performance, confirming that the number and position of nitro groups strongly influence the energetic potential of these molecules. When compared to a well-known reference explosive, TNT (Trinitrotoluene), which has a detonation velocity of approximately 6900 m/s and a detonation pressure around 210 kbar, it is evident that several of the studied nitro-furanocoumarins—particularly the tetranitro derivatives—surpass TNT in both velocity and pressure. This highlights their promising potential as next-generation energetic compounds.

Overall, the findings indicate that furanocoumarins, owing to their rigid aromatic scaffold and the possibility of structural modification, can serve as strong candidates for the design of new HEMs. The observed consistency between calculated detonation parameters and total energy values highlights the reliability of computational methods in predicting performance and stability. Future work should involve additional computational studies with more advanced methods to refine these predictions, followed by synthesis and experimental validation to confirm the energetic performance and safety profile of these novel compounds.

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MECHANICAL TESTING WITH MODELLING OF STRESS DISTRIBUTION IN NICKEL THIN COATINGS ON DIFFERENT SUBSTRATES AS A METHOD FOR ASSESSING ADHESION QUALITY

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ABSTRACT

Purpose: Covering materials with thin coatings is often necessary to protect them from wear and corrosion, ensure electrical conductivity, or form the structural microelectromechanical elements. For a composite system to maintain its integrity, it is necessary to understand its mechanical properties. The most important property that evaluates the integrity of composite systems is the adhesion strength between the substrate and the coatings. Poor adhesion can lead to the deterioration of the protected material or the failure of a component, or result in significant property damage, serious injuries, or loss of life. Analysing material adhesion problems and their causes of failure is crucial for forensic engineers.

Design/Methods/Approach: Thin foils of brass and stainless steel were chosen as the substrate materials. Nickel coatings were electrodeposited from sulphamate electrolyte. The bidirectional bending test, performed on a special structure, and the cross-hatching test were used for mechanical testing of adhesion. The number of bending cycles until material failure is determined. An analysis of stress distribution was conducted in addition to the bidirectional bending test. These results contributed to a better understanding of the mechanical behaviour of the system during bending, particularly in areas with high stress concentrations that may cause damage. After performing the cross-hatching test, the adhesion quality was assessed. A relation was made between adhesion quality criteria.

Findings: The crystallographic and mechanical properties of both the substrate and the coating, as well as the deposition process parameters and the thickness of the coatings, must be considered. Better adhesion is achieved with thin coatings and a similar crystallographic structure. Mathematical modelling of mechanical tests facilitates the monitoring of the testing process.

Originality/Value: Connecting the results of adhesion testing to the analysis of stress distribution will contribute to a better understanding of the phenomena that occur in composite systems. A quantitative relationship was established between the adhesion criteria.

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Keywords: coating adhesion, nickel electrodeposition, bidirectional bending test, the critical cycle number, crosshatch adhesion testing, stress distribution

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PURPOSE

Covering materials with thin coatings is often necessary for protecting them from wear and corrosion, ensuring electrical conductivity, and also in planar technologies for forming the structural elements of MEMS (microelectromechanical systems) components (Mittal, 1976; Medou, 1997; Ellahi, 2020). Substrates and one or more coatings on them constitute a composite material system. For the coating and substrate composite system to be of intact integrity, it is necessary to know and coordinate their mechanical properties. If substrates are not adequately chosen to provide coating support, there is a high risk of substrate and coating deformation under stress. The most important property that evaluates the integrity of the composite systems is adhesion strength between the substrate and coatings (Zhang et al., 2019; Chen et al., 2014). Adhesion strength is the maximum force per unit width of the sample that the coating/substrate system can withstand without showing coating failure.

Poor adhesion can lead to the deterioration of the protected material or the rapid failure of a component - that is, the separation or delamination of the coating from the substrate. Still, it can also lead to more serious accidents resulting in significant property damage, serious injuries, or loss of life. Therefore, analysing material adhesion problems and their causes of failure is crucial for forensic engineers (Peruzzi, 2021; Davis & Bond, 1999).

The adhesion of coatings on substrates is a peculiar and complex phenomenon that depends on surface energy, substrate cleanliness (presence of defects and impurities), elastic and thermal mismatch between the substrate and coating (mismatch of their elastic modulus and their coefficient of thermal expansion), roughness, and coating thickness, among other factors (Mittal, 1976; El-Shabasy, 1981; Chen et al., 2014; Rudawska, 2016; Lamovec et al., 2016, 2019; Mladenovic et al., 2017, 2025).

The importance of a thorough assessment of the adhesion strength of coatings on different substrates is evident from the considerable effort invested in developing various quantitative and qualitative methods for its evaluation. A broad classification of methods for characterizing the adhesion of coatings includes nucleation-based, mechanical, and other miscellaneous techniques. Nucleation methods for adhesion assessment often refer to methods that examine how coatings initiate bonding at the atomic or molecular level (e.g., during electrochemical deposition). Miscellaneous techniques typically include thermal, acoustic, and spectroscopic methods, as well as hybrid approaches that combine elements from multiple testing domains.

However, the most significant number of tests and adhesion assessment results in the scientific and professional literature were obtained through mechanical testing of composite coating systems on substrates (Chen et al., 2014; Valli, 1986; Hull et al., 1987; Rezaee et al., 2019). The mechanical methods that are most often used to assess the adhesion strength are the direct pull-off method (Valli, 1986), bending testing (Rezaee et al., 2019; ASTM International, 2022; Zhu et al., 2012), the scratch testing (Zhang et al., 2019; Konuru et al., 2021; Bull, 1997), and indentation testing (Zhang et al., 2019; Konuru et al. 2021; Magagnin et al., 2003; Mladenovic et al., 2019; Lamovec et al., 2018; Hou et al., 1999). The application of modern software packages and the possibility of modelling and simulating real engineering problems have greatly facilitated their understanding and solving (Jindra et al., 2021).

DESIGN/METHODS/APPROACH

Electrochemical deposition is a widely used technology for producing high-quality metal coatings on substrates, with nickel being one of the most commonly deposited metals. Electrochemical deposition techniques leave much room for manoeuvring process parameters, enabling precise control over the



resulting coating microstructure. The microstructure directly affects the mechanical properties of adhesion in coating/substrate composite systems. Composite systems are made by electrochemically depositing nickel of varying thicknesses onto brass and stainless-steel substrates, and they represent material systems with different structural and mechanical properties (Ebrahimi et al., 1999; Lamovec et al., 2008).

Bidirectional bending and cross-hatching tests were employed to evaluate the adhesion of nickel films on various substrates; both techniques are classified as destructive methods for assessing adhesive properties. The bidirectional bending adhesion testing involves the dynamic cyclic bending of a composite system, comprising nickel coatings on brass and stainless-steel substrates, using a specially designed splint. The number of cycles until the appearance of the first signs of coating separation, i.e., the occurrence of delamination of the coating from the substrate, is determined, and this number is called the critical number of cycles (Zhu et al., 2012; Yu et al., 2012; Mušicki et al., 2025). According to the applicable standard, the cross-hatching method evaluates the adhesion quality of the nickel coating by determining the fraction of the surface that detaches from the substrate. The adhesion quality is quantified as the percentage of the coating removed after a specialized adhesive tape is applied to and pulled from the hatched area (ASTM International, 2022). Simulation of the bidirectional bending process enabled the analysis of stress distribution within the coatings during deformation, providing insight into the experimental results.

Thin foils of brass and stainless steel were prepared for use as substrate materials. Dimensions of the samples prepared for different adhesion tests were 10 mm x 100 mm and 20 mm x 100 mm. The adhesion quality of coatings to the substrate depends on thorough substrate preparation. The preparation process involves mechanical polishing followed by degreasing and concludes with thorough rinsing and drying of the substrates. Brass and stainless-steel substrates were polished using silicon carbide (SiC, P600-1200) sandpaper of varying grit sizes, followed by sequential rinsing with acetone, ethyl alcohol, and distilled water.

Electrically non-conductive and thermally insulating tape was used to define the specific areas of the substrate surface designated for electrochemical deposition of nickel coatings. Surface areas measuring 10 mm x 60 mm and 20 mm x 20 mm were defined for the bidirectional bending and the cross-hatching testing, respectively.

Nickel coatings were electrochemically deposited from a sulphamate-based electrolyte composed of 300 g/L $\text{Ni}(\text{NH}_2\text{SO}_3)_2 \cdot 4\text{H}_2\text{O}$ (Sigma Aldrich, CAS Number: 124594-15-6), 30 g/L $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ (Sigma Aldrich, CAS Number 7791-20-0), 30 g/L H_3BO_3 (Supelco, CAS Number: 10043-35-3), and 1 g/L saccharin (Sigma Aldrich, CAS Number: 81-07-2). The electrochemical deposition process was carried out in DC galvanostatic mode at a constant current density of 33 mA/cm². The electrolyte temperature and pH were maintained at 50 °C and 4.20, respectively. The electrolyte was constantly stirred with a magnetic stirrer to prevent the inclusion of hydrogen, which is released simultaneously at the cathode, into the nickel coatings. The duration of electrodeposition was calculated based on the selected deposition area, applied current density, and projected coating thicknesses of 5, 10, and 20 µm. For microstructural analysis, a sample with a 10-µm-thick nickel coating was etched in a solution containing 25 ml H_2O , 25 ml glacial CH_3COOH , and 50 ml HNO_3 for 60 seconds to reveal the grain boundaries (Lamovec et al., 2008).

Topographic examination of the brass and stainless-steel substrate surfaces and composite systems with electrochemically deposited nickel coatings was performed using optical and atomic force microscopy (AFM, AutoProbe CP Research; TM Microscopes, Veeco Instruments, Santa Barbara, CA, USA). Based on topographic AFM images, it was possible to obtain information about the roughness of the substrate surface, which is an important parameter for assessing adhesion. Performing bidi-



rectional bending tests for adhesion assessment required developing a specially designed structure (splint) based on literature references, as presented in Figure1 (Zhu et al., 2012).

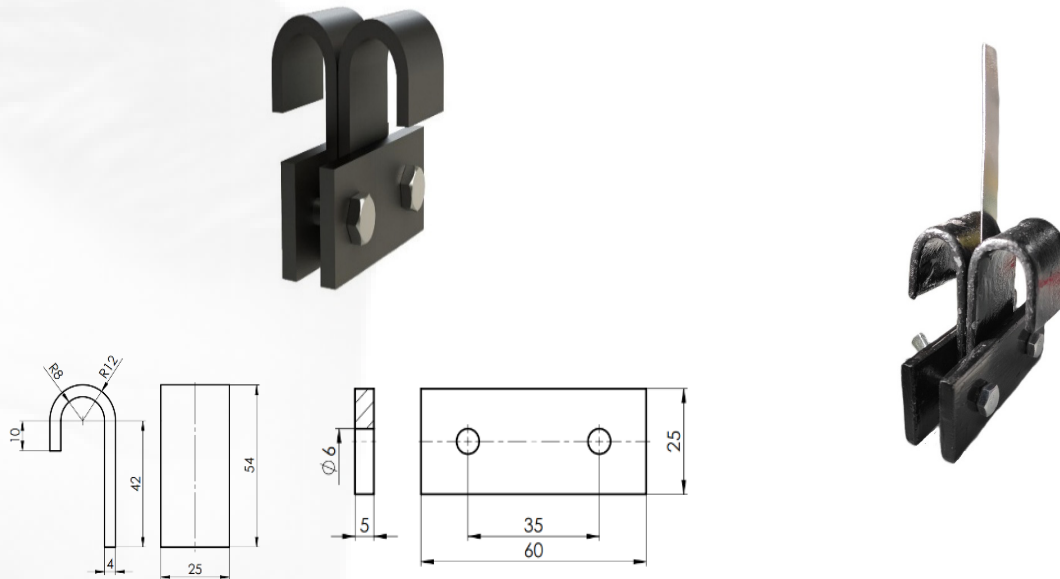


Figure 1: Computer-aided design and realisation of bending supports for the bidirectional testing. The starting position of the test specimen fixed in the splint is shown.

The samples prepared for this test measured 10 mm × 100 mm, with a nickel-coated area of 10 mm × 60 mm. Adhesion assessment was carried out as follows: each sample was inserted and securely clamped between bending supports within a specially designed splint, which was fastened using screws and nuts. While holding the free end of the sample, it was bent firmly to one side and held in position for several seconds. The procedure was then repeated in the opposite direction to complete the bidirectional bending cycle. This procedure constitutes one bending cycle. The test determines the critical number of cycles, defined as the point at which adhesion failure occurs and the coating begins to delaminate or peel off. The selected maximum number of bending cycles was 100.

The cross-hatching method for evaluating coating adhesion was performed following ASTM D3359-22, Test Method B (ASTM International, 2020). A cutting tool with a sharpened edge was used to create the grid pattern manually. Parallel cuts were made in one direction, followed by a second set of cuts perpendicular to the first, forming a cross-hatch grid. Each cut was 20 mm in length and spaced 1 mm apart. Cutting was performed by pulling in one smooth motion, using sufficient pressure to reach the substrate as shown in Figure 2.

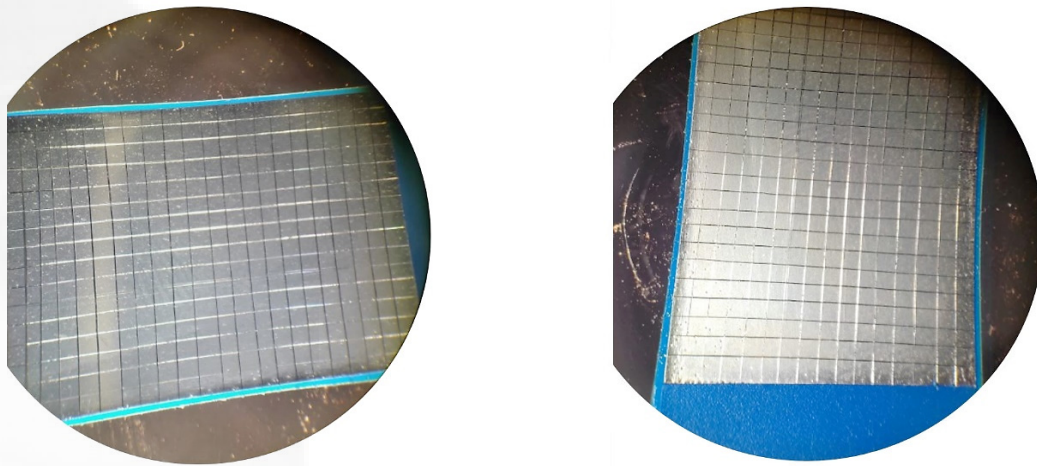


Figure 2: *The initial phase of cross-hatch testing, the process of drawing a cross-hatch on a nickel coating*

Detached portions of the coating were gently removed with a soft brush to minimise any influence on the test results. A pressure-sensitive tape (type 3M duct tape, Deutschland GmbH) was applied by placing its centre directly over the cross-hatch grid. The tape was gently smoothed to eliminate any air pockets between the tape and the nickel coating surface. After a waiting period of 90 seconds, the tape was removed by quickly pulling it back from the free end at a consistent angle. Adhesion was evaluated based on the percentage of the coating removed from the substrate, using the classification system defined in ASTM D3359-22, as follows:

- 5B: 0% area removed
- 4B: Less than 5% area removed
- 3B: 5–15% area removed
- 2B: 15–35% area removed
- 1B: 35–65% area removed
- 0B: More than 65% area removed

Modelling and simulation of the bidirectional bending testing was performed in the ANSYS 2025 R2 program. The model was formed according to the real dimensions of the splint for bidirectional bending testing.

FINDINGS

Adhesion performance was analysed for composite systems of electrochemically deposited nickel coatings of varying thicknesses on brass and stainless-steel substrates, fabricated at a constant current density. The resulting composite systems were evaluated using bidirectional bending and cross-hatching adhesion tests. Brass and stainless steel, which differ in microstructure and surface topography, were used as substrate materials. Due to the minor mismatch in crystallographic structure between nickel and brass, strong adhesion was observed on brass substrates. In contrast, nickel coatings exhibited weak adhesion on stainless steel substrates. Reduced film thickness and increased substrate surface roughness enhance the adhesion of nickel coatings, with a particularly notable effect observed on stainless steel substrates. Simulation of the bidirectional bending test revealed the stress distribution within the coatings and identified critical points of maximum stress, which were consistent with the results obtained from the experimental testing.

RESULTS AND DISCUSSION

Topographic Characterization of Substrates and Electrodeposited Ni Coatings

The surface topographies of both substrates and nickel coating were analysed using stereomicroscopy and the Atomic Force Microscopy (AFM) technique to enhance the understanding and interpretation of the results obtained from adhesion testing using dynamic two-directional bending and static cross-hatching methods. Figure 3 presents stereomicroscopic and AFM images of the sandpaper-polished surfaces of brass and stainless-steel substrates.

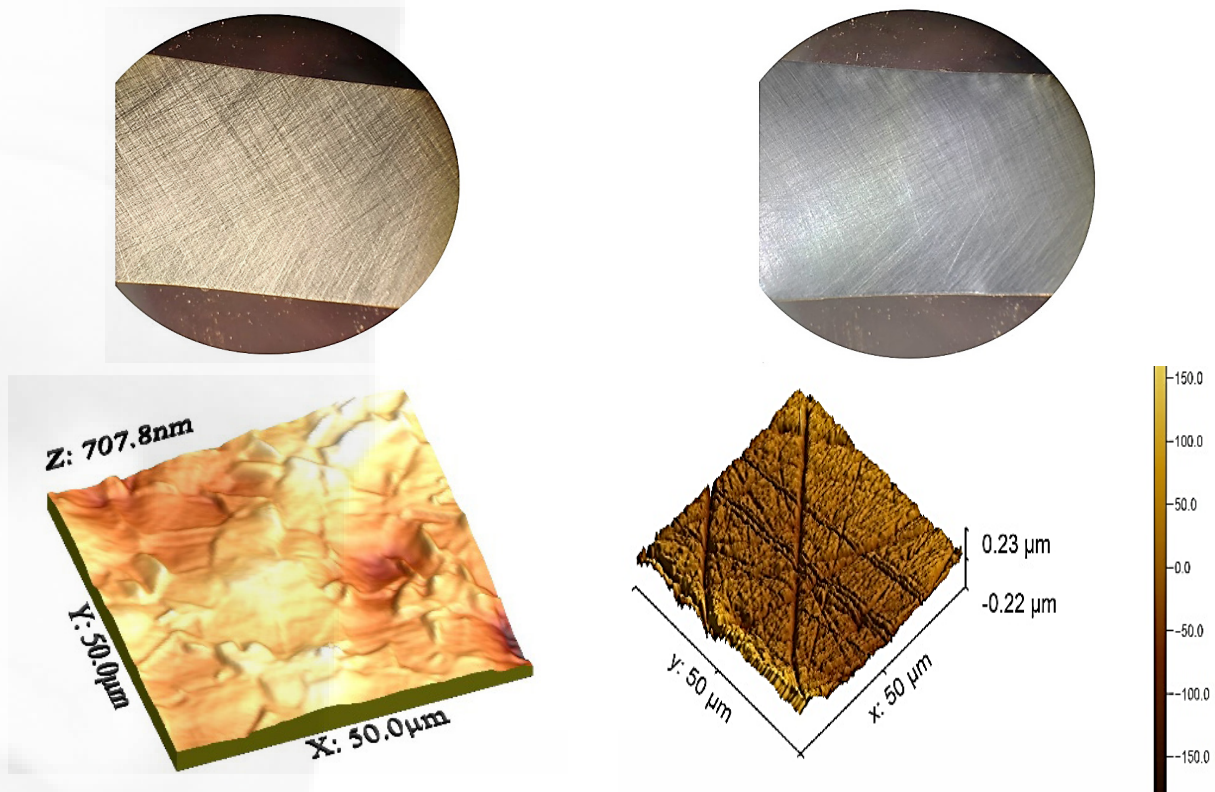


Figure 3: The stereomicroscopic and AFM topography images of the sand-polished and etched brass (left) and the stainless steel (right) substrates

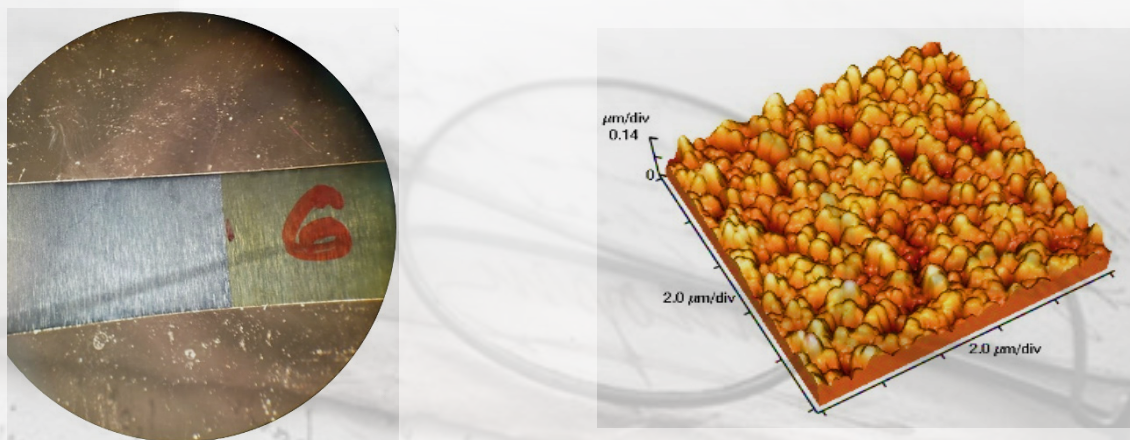


Figure 4: Stereomicroscopic image of the as-electrodeposited nickel coating (10 μm thick) on brass substrate and an AFM topography after etching in a grain-boundary-revealing solution.

Figure 4 shows the optical image of the as-electrodeposited nickel coating with a thickness of 10 μm , alongside the AFM image obtained after etching in a grain-revealing solution for 60 seconds.

Adhesion Characterization of Electrochemically Deposited Nickel Coatings on Brass and Stainless-Steel Substrates

The characterization of adhesion quality for nickel coatings on brass and stainless-steel substrates began with drawing a cross-hatch pattern on the coating surface, as shown in Figure 5.

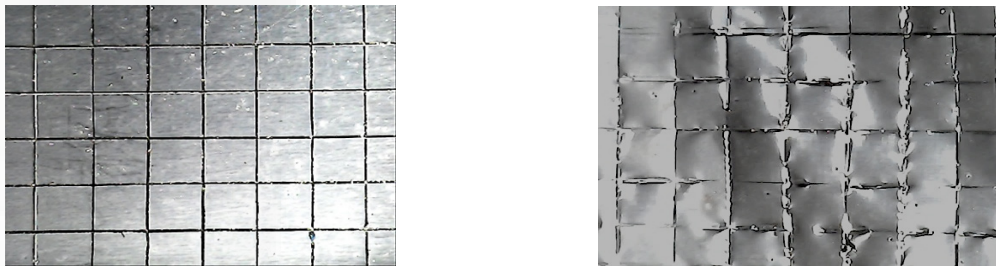
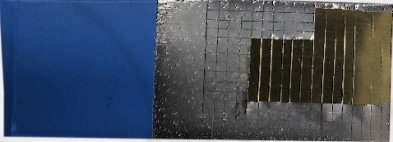
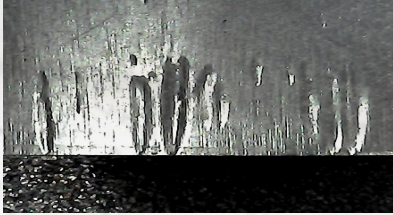
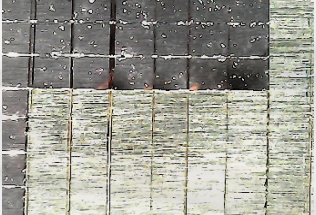


Figure 5: The process of drawing a cross-hatch on nickel coating on brass substrate (left), and nickel coating on stainless steel substrate (right)

The result images of the chosen samples of composite systems of nickel coatings on brass and stainless-steel substrates, exhibiting the most characteristic behaviour after the cross-hatching adhesion test (Method B), along with the two-directional bending test, are presented in Table 1 and quantitatively summarized in Table 2.

Table 1: Representative images of the test results highlighting characteristic features of nickel coatings electrodeposited on brass and stainless-steel substrates.

	Coating thickness (in μm)	Bending test	Cross-hatching test
Brass substrate	5		No coating delamination.
	10		No coating delamination.
	20		
			

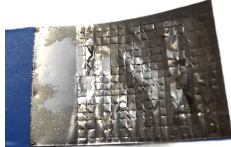
Stainless-steel substrate	5		
			
	10		
			
	20		Complete coating delamination
			

Table 2: The results of the adhesion tests of nickel coatings with different thicknesses electrodeposited on brass and stainless-steel substrates

	Coating thickness (in μm)	The critical cycle number	The value of the cross-hatch test, method B
Brass substrate	5	/	5B
	10	/	5B
	20	47	1B
Stainless-steel sub- strate	5	8	0B
	10	2	0B
	20	2	0B

Simulation and analysis of the two-directional bending testing was performed using the ANSYS 2025 R2 software package, focusing on the behaviour of sheet metal samples coated with a protective film under bending loads. The simulation results are presented as stress distribution contours, with maximum stress indicated in red and minimum stress in blue, as presented in Figure 6.

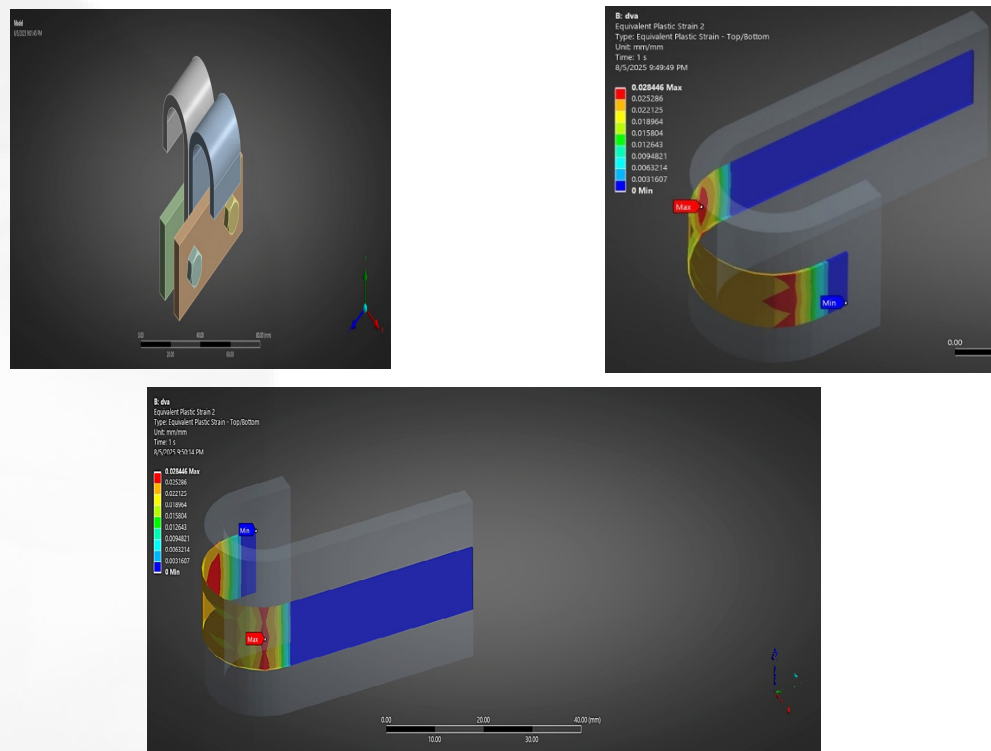


Figure 6: Results of the simulation of the two-directional bending test according to the presented experimental conditions

ANALYSIS OF THE PRESENTED RESULTS

The adhesion of nickel coatings electrochemically deposited on brass and stainless-steel substrates has been analysed. The substrates were prepared using a consistent procedure, which included degreasing and mechanical polishing with sandpaper. As shown in Figure 3, the substrate surfaces exhibited a noticeable degree of roughness, which can contribute to improved coating adhesion. Both substrates belong to alloys whose crystallographic structure depends on their composition. Due to the potential crystallographic similarity (the same type of FCC crystal lattice is expected for the used brass substrate) between nickel and brass, improved adhesion performance of nickel coatings on brass substrates was anticipated. Nickel coatings were deposited from a sulfamate electrolyte solution with the addition of saccharin. This electrolyte composition, combined with applying the higher current densities, enables the formation of fine-grained coatings with reduced internal stresses — factors that are particularly beneficial for achieving high-quality adhesion. Figure 4 shows the fine-grained columnar microstructure of the nickel coating after etching in a grain-boundary-revealing solution.

Adhesion performance testing was performed with cross-hatching and bidirectional bending tests. Visually, the adhesion quality could already be compared while drawing a cross-hatch as part of the cross-hatching test. Figure 5 (image on the right) clearly shows the loosening of the nickel coating adhesion on the stainless-steel substrate during the cross-hatch drawing process.

In addition to the type of substrate, it has been shown that the quality of adhesion of coatings on substrates depends a lot on the coating thickness. Nickel coatings with thicknesses of 5 μm and 10 μm on brass substrates exhibited excellent adhesion during the cross-hatching test. After testing with a special adhesive tape, no signs of delamination were observed, and the coatings were classified as cat-

egory 5B according to the standard. The coating with a greater thickness of 20 μm exhibited reduced adhesion, with partial delamination observed after application of the adhesive tape. Due to the significant portion of the coating surface that became detached, the adhesion performance was classified as category 1B. In the crosshatching adhesion test, the adhesion results of the nickel coatings on stainless steel were poor, regardless of the thickness of the coating, and classified as category 0B. This category indicates that more than 65% of the coating was removed from the substrate and adhered to the adhesive tape (Table 1, 10- μm -thick nickel coating electrodeposited on stainless-steel substrate transferred to the adhesive tape). Similar adhesion quality results were obtained through dynamic bidirectional bending testing, as shown in Table 2. The selected maximum number of bending cycles was 100. Nickel coatings of 5 μm and 10 μm thickness on the brass substrate showed excellent adhesion quality, where no signs of delamination were observed after 100 bending cycles. The thicker nickel coating (20 μm) on the brass substrate yielded after 47 cycles, as shown in Tables 1 and 2. The critical number of bending cycles for nickel coatings on stainless steel substrate was extremely low. This test also confirmed the assumption that the adhesion quality will depend on the thickness of the nickel coating. For a coating with a thickness of 5 μm , the critical number was 8 cycles. For coatings with a thickness of 10 μm and 20 μm , the critical cycle number was only 2. The experimental findings demonstrated a strong correlation with the simulation results. Based on the simulated stress distribution, it was possible to identify critical points where worsening of the nickel coating's adhesion was most likely to occur. These predicted failure points aligned well with the areas where delamination was observed during experimental testing, thereby validating the accuracy of the numerical model.

ORIGINALITY/VALUE

Identifying and evaluating the factors that influence the adhesion strength of coatings on substrates is crucial, as the structural integrity of components, devices, or entire constructions often depends on the adhesion quality. Material system failures due to inadequate adhesion are a common cause of structural or functional breakdowns, making adhesion a critical consideration in forensic engineering analyses. Each composite system is unique and must be analysed individually because many variable parameters are involved. The results presented in this paper provide valuable insights into predicting the factors that influence the behaviour of composite material systems and their integrity. Combining adhesion test simulations with experimental results allows for a reduction in both time and material resources - an important advantage, given that most adhesion testing methods are inherently destructive.

CONCLUSION

This study evaluated the adhesion performance of electrochemically deposited nickel coatings on brass and stainless-steel substrates through experimental mechanical testing and finite element simulation. Nickel coatings were deposited from a sulphamate-based electrolyte with saccharin as a stress-reducing agent. Key parameters such as coating thickness, substrate surface roughness, and failure behaviour under mechanical stress were examined to establish correlations and assess the reliability of the applied testing methods. Two destructive testing methods, bidirectional bending and cross-hatching, were employed, alongside non-destructive numerical modelling to analyse stress distribution and predict failure initiation zones.

The results demonstrated that the substrate material's microstructure, surface roughness parameters, and coating thickness significantly influence the adhesion quality of the nickel coatings.



Based on the results obtained, we can highlight the following:

- Nickel coatings on brass substrates exhibited excellent adhesion for both tests, particularly at lower thicknesses (5 μm and 10 μm), with no delamination observed even under extended mechanical stress.
- Increasing the nickel coating thickness on the brass substrate to 20 μm demonstrated lower adhesion performance, suggesting that increased coating thickness can negatively influence interfacial bonding integrity.
- In contrast, nickel coatings on stainless steel substrates showed poor adhesion performance across all thicknesses, with early onset of delamination during both tests. These disparities are primarily attributed to differences in microstructural compatibility and substrate surface roughness.
- Adhesion bending test simulations closely matched the experimental results and identified critical stress regions associated with coating failure.

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ADVANTAGES, RISKS AND DUAL-USE CHALLENGES OF NANOTECHNOLOGY IN CBRN'S BIOLOGICAL SCENARIOS

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ABSTRACT

Purpose: CBRN (Chemical, Biological, Radiological, and Nuclear) threats, particularly biological agents, are inherently volatile and difficult to control. Their early detection, identification, mitigation and neutralization, specifically of those that are novel, engineered, or intentionally released, represent a major challenge. Nanotechnology offers promising, new tools and approaches to address these issues, with applications ranging from highly sensitive and selective detection platforms to smart materials and devices for identification, protection and mitigation, as well as advanced decontamination methods and technologies that could strengthen the preparedness and response in CBRN settings.

Design/Methods/Approach: A comprehensive scientific literature review was conducted using systematic content analysis and comparative assessment, emphasizing the advantages, risks, and dual-use implications of nanotechnology in the context of CBRN security.

Findings: The use of nanotechnology in CBRN systems can significantly improve the early threat detection, agent identification, treatment, environmental monitoring, safety and functionality of personal protective equipment, filtration systems, etc. Nonetheless, the same features that make these prevalent technologies beneficial, also, raise ethical dilemmas and safety concerns about their potential misuse. The engineered nanomaterials, for instance, could potentially be repurposed for hostile applications, including targeted delivery of biological toxins or gene-editing agents. Therefore, the implementation of nanotechnology in CBRN landscape must be balanced with responsible oversight and ethical considerations.

Originality/Value: The paper provides a multidisciplinary and integrative perspective of nanotechnology applications in CBRN scenarios, synthesizing the most notable and important scientific reports and discussions regarding the emerging capabilities, associated risks, and the need for strategic planning for the safe and ethical use of advanced materials and nanotechnology in CBRN.

Keywords: CBRN threats; preparedness and response; nanotechnology; advantages, risks and dual-use challenges.

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INTRODUCTION

Chemical, Biological, Radiological, and Nuclear (CBRN) agents include a broad spectrum of hazardous substances, organisms and materials, like toxic chemicals, infectious pathogens, radioactive, and nuclear materials, with the potential to cause devastating and catastrophic consequences in human, animal, and plant populations, environment, and infrastructure. The history of their use is extensive, complex and shaped by numerous pivotal events (Robertson & Robertson, 1995). For instance, the large-scale deployment of chemical agents during World War I encouraged international community to adopt the 1925 Geneva Protocol, which prohibited their use in warfare (UN, 1925). Both **ancient** and modern misuse of biological agents served as the basis for signing the Biological Weapons Convention in 1972, intended to ban their development and improvement of their delivery systems, production, and stockpiling (UN, 1972). Moreover, the bombing of Japan at the end of World War II, stressed the harrowing potential of nuclear weapons, and led to drafting and adoption of few agreements, including the Treaty on the Non-Proliferation of Nuclear Weapons (UN, 1968).

Although CBRN agents can be detrimental, they can also have legitimate and beneficial applications. Certain chemical agents are employed in various industrial areas and medicine, while some nerve agents have been investigated for therapeutic purposes. Biological agents are used both in medicine and research, such as development of vaccines from deteriorated or inactivated pathogens. Finally, radiological materials are widely utilized in medicine for diagnosis and treatment of cancer as well as in various industrial processes, while nuclear materials are also used in diagnosis and for imaging, as well as for electricity generation in nuclear power plants (NRC, 2007; WHO, 2004; WNA, 2025).

Whether they arise from natural events, accidental release, or intentional use or misuse, CBRN agents have unique properties and modes of action that require specialized detection, prevention and response strategies. Their complexity and potential impact on societies make their containment specially challenging at every phase, from the initial signs of their presence to the complete clearance at the location, while often involving coordinated efforts across multiple disciplines and agencies (WHO, 2004). Namely, their rapid and accurate identification and detection are usually difficult due to their varied properties, the possibility of mixed contamination, being invisible and odorless, or causing delayed health effects (IFRCRCS, 2023). Even when modern detection systems are used, field conditions can reduce their speed and accuracy. Neutralization and mitigation of these agents require methods that are sufficient to inactivate or destroy them and, simultaneously, be safe for people, infrastructure, and the environment. Another problem is decontamination with no single solution for all types of



agents, while the choice of method is determined by the surface of agent, surrounding conditions, and available resources (WHO, 2004). Ultimately, the success of the entire process depends not only on good preparation, training, and the ability to align technical decisions with operational realities, but also on the use of advanced technologies.

COUNTERING BIOTHREATS, NANOTECHNOLOGY AS A NOVEL SOLUTION

Among various CBRN threats, biological agents or biological threats (biothreats) that include bacteria, viruses, fungi, and toxins derived from diverse living organisms, are extremely insidious due to their stealth, adaptability, routes of exposure (inhalation, ingestion, or direct contact), disruptive potential, and other diverse features that make them particularly suitable to weaponization (Roffey, Lantorp, Tegnell & Elgh, 2002; Oliveira, Mason-Buck, Ballard, Branicki & Amorim, 2020). The devastating impact of these agents has been demonstrated throughout history. Historical 20th-century state-run bioweapons programs in Japan, the Soviet Union, and elsewhere, as well as relatively small-scale event, 2001 anthrax attacks in the U.S., are genuine reminders of their destructive potential (Christopher, Cieslak, Pavlin & Eitzen, 1997; Inglesby et al., 2022). Furthermore, the recent global outbreak of coronavirus, the COVID-19 pandemic, has further stressed how even naturally occurring biothreats can rapidly reform economies, governance, and public trust in a short time (Nicola et al., 2020).

From a public health and security perspective, their small size, potential for rapid and silent transmissibility, and ability to replicate within a host make biothreats difficult to detect and control. Additionally, their capacity to remain undetected for prolonged periods and to trigger epidemic or pandemic outbreaks, chronic health problems, and mass casualties complicates countermeasures both technically and strategically (Roffey et al., 2002).

The traditional detection methods are widely accepted, time-tested approaches that rely on well-understood biological, chemical, and physical principles. Among them the most commonly used are: cell culture, assays based on biochemical and immunological recognition, biomolecular techniques like polymerase chain reaction, animal lethality assay, or physical methods such as gas-liquid chromatography, high-performance liquid chromatography, thin-layer chromatography, capillary electrophoresis, smear microscopy with a sputum sample, and others (Drakulić et al., 2013; Drakulić et al., 2015; Joksić et al., 2017; Todorović et al., 2019; Miletić Vukajlović et al., 2020; Todorović, Bobić & Drakulić, 2023; Gligorov et al., 2023; Todorović et al., 2024; Valenta Šobot et al., 2024). These approaches have been the standards for decades, however they are usually expensive, laboratory-based, time-consuming, complex, with abysmal specificity, require purified samples and specialized equipment and trained personnel, or they are not well suited for emerging or engineered pathogens (Parida, Dash & Shukla, 2020). Moreover, the conventional methods for decontamination and prevention are primarily based on the use of physical and chemical agents. While effective in many cases, the physical methods like sterilization via heat, the application of powerful UV radiation, and chemical decontamination through the use of broad spectrum disinfectants including chlorine-based solutions (e.g., sodium hypochlorite), formaldehyde, or hydrogen peroxide, are generally corrosive, toxic to living populations, and require significant time and labor for large-scale application, making them difficult to use for rapid response in a biological incident (CDC, 2023).

In recent years, thus, the efforts in the field of biothreats detection, identification, neutralization and decontamination technologies have been made to overcome the shortcomings of traditional methods by providing unprecedented speed, sensitivity, and portability. The modern CBRN defense methods



employ a broad range of various analytical and physical solutions. For instance, those for detection and identification, like advanced analytical techniques, mass and ion mobility spectrometry, are utilized for rapid and precise recognition of the agents (Perida et al., 2020; Todorović et al., 2023; Todorović et al., 2024). The Advanced Oxidation Processes that use the powerful oxidants like ozone are efficient in neutralization of contaminants, while the Laser Decontamination is used for vaporization of the harmful substances from surfaces (Saravanan et al., 2022; Laserax, 2025). Moreover, the additional strategic disciplines and trends that stand out in CBRN defense systems and that could accelerate the response time against the threats and moderate their adverse effects are: artificial intelligence, internet of things, remote sensing, advanced materials, and nanotechnology (Pantić et al., 2022).

Nanotechnology, a multidisciplinary field, refers to the design, manufacture, manipulation, and application of materials, structures, devices, and systems with structural features on the nanoscale (1 to 100 nm) (De Luca, Nagy & Macario, 2023) and spherical surface area-to-volume ratio exceeding $60 \text{ m}^2\text{cm}^{-3}$ (Mekuye & Abera, 2023). Nanomaterials (NMs) can be classified according to **origin** (natural, or artificial), **structural configuration/composition** (organic, inorganic, carbon-based, and composite), **dimensionality** (0-3 dimensions (D)), **pore sizes** (micro-, meso-, and macroporous), **solubility** (dispersed, or aggregated), **phase** (single-phased, or multi-phased), potential toxicity (fiber-like, persistent granular, and CMAR (carcinogenic, mutagenic, asthmagenic, or reproductive toxin)), and others (Mekuye & Abera, 2023; Kurul, Turkmen, Cetin & Topkaya, 2025). They exhibit unique and distinct morphological and physicochemical properties including smaller size, lighter weight, distinct magnetic properties, enhanced stability, mechanical strength and surface reactivity, higher specificity in molecular interactions, altered permeability, and improved electrical and heat conductivity that make them differ fundamentally from bulk materials, single atoms, and molecules. Their characteristics arise from quantum effects, enlarged surface area-to-volume ratio, and presence of interphase domains that make the application of these materials highly versatile, and applicable in numerous sectors of science and technology, and well suited for the CBRN biological landscape (Guidotti, Ranghieri & Rossodivita, 2009). As dimensions of nanoscale materials are similar to those of cells, genetic molecules, microorganisms, and tissues, they are transforming drug delivery systems, enabling targeted therapies that increase treatment effectiveness while minimizing adverse side effects. By providing innovative, interdisciplinary solutions and strategies to complex health challenges, they simultaneously advance diagnostic imaging, biosensing, tissue repair processes and regenerative medicine (Agrahari et al., 2016; Kargazar & Mozafari, 2018). While in the light of CBRN protection, nanotechnology also provides state-of-the-art multidisciplinary tools for the detection, neutralization, and decontamination of hazardous agents. Nanoscale materials can be incorporated into protective clothes, filters, sensors, decontamination agents, where they enhance the sensitivity of detection systems, improve the efficiency of neutralization strategies, and facilitate rapid, targeted decontamination of polluted locations, thereby strengthening preparedness and response capabilities in both military and civilian contexts (De Luca, Chiodo, Macario, Siciliano & Nagy, 2021; De Luca et al., 2023). Moreover, in the environmental science, nanotechnology is shown to be useful for pollution remediation, detection of environmental contaminants at unprecedented sensitivity levels, facilitating early warning systems for public health and safety (De Luca, Macario, Siciliano & Nagy et al., 2022). While providing numerous advantages, the rapid development of nanotechnology also raises substantial concerns related to safety, ethical consideration, and regulatory issues, including the potential toxicity of nanoparticles (NPs) (Todorovic et al., 2024), their impact on the environment, and the risks associated with their dual-use applications (Shajar et al., 2023).

Nanotechnology-based technologies for biothreat detection: real-time diagnostics, nanobiosensors

In CBRN detection, the real-time diagnostics has a pivotal role. Nanotechnology has widely been used in design of portable real-time diagnostic tools that are rapid, highly sensitive and suitable for early



detection of hazardous agents directly in the field (Lai et al., 2024; Mishra et al., 2025). A variety of nanosensors are exploited, including nanobiosensors, optical nanosensors, carbon-based nanosensors, and others for detection of biomarkers, biological agents/threats present at extremely low concentrations (Diez-Pascual, 2021; Lai et al., 2024; Mishra et al., 2025).

Nanobiosensors, or biosensors based on nanotechnology, are advanced analytical devices in nanometers scale that combine a biological recognition element with a physical or chemical transducer to quantify analytes like pathogens, biomolecules, or environmental sources with a high sensitivity and specificity (Chaturvedi, Tripathi & Ranjan, 2025; Mishra et al., 2025). The principle of nanobiosensor operation relies on the binding of a specific biological agent (analyte) to the recognition element (cell-based, tissue-based, or a molecule like an enzyme, DNA strand, or antibody) that induces measurable change of NMs, which is subsequently converted into a detectable optical, electrochemical, electrical, and other forms of signal (Sainz-Urruela, Vera-López, San Andrés & Díez-Pascual, 2021). The high surface area of NMs allows greater immobilization of receptors to the sensor which enables a higher density of sensing elements within a confined space and more efficient binding interactions with the target analyte that generate stronger and more reliable signal (Ahmadi, Warkiani, Rabiee, Iravani & Rabiee, 2023; Mirzadeh-Rafie et al., 2023). The detection of targets is straight from the sample, rapid, real-time, accurate, reversible, and non-destructive, while the small size of these devices make them suitable for field-based sensors (Rowland, Brown, Delehanty & Medintz, 2016) and especially valuable in CBRN events, including detection of contaminants, and pathogens, and disease markers in bodily fluids like sweat, saliva, urine, and blood, as well as disease monitoring (Mishra et al., 2025). Different NMs have been used for nanobiosensors to achieve better performance and enhance their applicability in CBRN scenarios. For instance, among metallic NPs most widely used are gold NPs (AuNPs), due to their good biocompatibility, high surface-to-volume ratio, unique optical properties, excellent conductivity, catalytic capabilities, and selectivity properties, as well as ability to easily form stable conjugates with biomolecules, which enable highly sensitive colorimetric or plasmonic detection of biothreats (Bilge & Sinag, 2025). AuNPs are used for detection of DNA of *Brucella species* with assay run in a short time (up to 10 min) within pg/ μ L detection limits (Sattarahmady, Tondro, Gholchin & Heli, 2015). While altering the surface with various molecules including other DNA sequences, antibodies, etc., these systems can be easily improved for detection of other bacterial DNA, viruses and specific toxins (Shyu, Shyu, Liu, & Tang, 2002; Guarise, Pasquato, De Filippis & Scrimin, 2006; Uzawa et al., 2008; Jannetto et al., 2010; Veigas et al., 2010). When incorporated into lateral flow immunoassays, the superparamagnetic AuNPs can be used for rapid detection of *Bacillus anthracis* spores, ricin, and others (Shyu, et al., 2002; Wang et al., 2015). These NPs are also integrated into advanced detection platforms, like surface enhanced Raman spectroscopy (SERS), inductively coupled plasma mass spectrometry (Zhang, Anderson, Huarng & Alocilja, 2011), quartz crystal microbalance, evanescent field-coupled waveguide-mode sensors (Saha, Agasti, Kim, Li & Rotello, 2012; Arcos Rosero, Bueno Barbezán, Daruich de Souza & Chuery Martins Rostelato, 2024; Karnwal et al., 2024), and localized surface plasmon resonance (LSPR) (Jin et al., 2009; Zhu, Du & Fu, 2009; Kleo, Kapp, Ascher & Lisdat, 2011; Gopinath, Awazu, Fujimaki, Shimizu & Shima, 2013), where they overall improve sensitivity and specificity of analyte detection (Chen et al., 2025; Shakir, Mirzakhil, Ulfat, Atif & Mansoor, 2025). Moreover, NPs synthesized from noble metals like palladium, platinum, and silver, or rare earth metals such as europium, gadolinium, and terbium, are also highly effective in immunoassay development (Algar et al., 2011). Among them, silver NPs (AgNPs) that exhibit antimicrobial properties demonstrate a significant potential for theranostic applications, where they can be employed for both identifying and treating infectious diseases (Rowland et al., 2016).

Optical nanosensors are fast, highly sensitive analytical devices for detection of various agents in CBRN scenarios, including biological like bacteria, viruses, and toxins. Among them, quantum dots (QDs),



quantum-confined semiconducting nanocrystals with intrinsic photoluminescence (PL), stand out as precise and reliable for real-time, multiplexed monitoring of various target analytes present in low concentrations. When functionalized with target-specific probes, QDs convert binding events into bright, easily detectable fluorescent signals, making them highly effective for sensitive detection applications (Rowland et al., 2016; Lai et al., 2024). For instance, antibody-labeled QDs are engineered to recognize proteins of toxins and viruses, including ricin and *S. typhi* (Goldman et al., 2004; Yang & Li, 2005; Gemmill et al., 2013), and also have been applied for simultaneous monitoring of cholera, ricin, SEB, and shiga toxin (Goldman et al., 2004). Moreover, antibody-labeled QDs can serve as fluorescent tags in combination with laboratory techniques such as agglutination and flocculation assays or flow cytometry (Wang & Morris, 2005; Zahavy, Heleg-Shabtai, Zafrani, Marciano & Yitzhaki, 2010). While QDs functionalized with aptamers, synthetic DNA capture elements, are shown sufficient in detection of bacteria, viruses, and toxins (Kiel, Holwitt, Parker, Vivekananda & Franz, 2004; Roh, & Jo, 2011).

When integrated into field-deployable platforms, such as Förster resonance energy transfer (FRET), SERS, and LSPR, QDs-based nanosensors provide rapid and high specificity results (Rowland et al., 2016). For example, several QD-based FRET sensors are successful in detection of botulinum neurotoxin (BoNT) (Sapsford et al., 2011; Lee et al., 2015), among other targets. Various biosynthetic QDs (BQDs) are also used for the creation of advanced highly sensitive electrochemical biosensors that use techniques like differential pulse voltammetry, electrochemical impedance spectroscopy, and electrochemiluminescence (Yao, Yan, Tang, Deng & Li, 2013; Wang et al., 2020; Pham et al., 2021; Yemets, Plokhovska, Pushkarova, Krasnylenko & Blume, 2022; Lai et al., 2024). Recently, QDs have been widely and successfully exploited for sensitive detection and inhibition of SARS-CoV-2, largely due to low toxicity, cost-effective synthesis, strong PL, and ease of functionalization with metallic NPs. These properties enabled fluorescence-based imaging of viral interactions, point-of-care diagnostics, and single-molecule tracking (Roh & Jo, 2011; Huang et al., 2020; Nasrollahzadeh et al., 2020; Singh et al., 2020; Ahmadi et al., 2023).

Carbon-based nanomaterials (CNMs), including carbon nanotubes (CNTs), fullerenes, graphene and its derivatives, nanodiamonds, and other nanosized carbon allotropes, in recent years are showing a promising potential in CBRN defense due to their unique properties such as biocompatibility, low toxicity, exceptionally large surface areas, superior electrical conductivity, mechanical strength, and ability to be functionalized (Diez-Pascual, 2021; Sainz-Urruela et al., 2021; Ahmadi et al., 2023). The identification of an analyte can be achieved by the simple visualization of aggregates formed upon binding, which is shown as successful method for the detection of *Bacillus anthracis* (Wang et al., 2006). Furthermore, CNTs are used as substrates for fluorescence-based assays in viral detection, e.g. a composite of CNTs, AuNPs, and QDs has been developed to recognize influenza virus (Lee et al., 2015). In this system, CNTs combined with AuNPs are functionalized with influenza antibodies, which are recognized by antibody-conjugated QDs that allow binding of the viral particles. The resulting PL signal enables detection of the virus across an exceptionally wide concentration range (Lee et al., 2015). CNMs can also be used as efficient quenching agents, as demonstrated with fluorophore-labeled single-stranded DNA. When attached to the surface of fullerene (including C60 fullerene) clusters, CNMs undergo PL quenching from the fluorophore, while upon hybridization with complementary DNA, the DNA-fluorophore complex is released from the C60 surface and the PL signal is restored (Li, Zhang, Luo & Sun, 2011). Additionally, CNMs have been successfully integrated into electrochemical sensing platforms (Singh et al., 2013; Singh, Sharma, Hong & Jang, 2014), like in the work of Das and coworkers (2011) in which a CNMs/nanoscale zirconia composite deposited on an indium-tin-oxide electrode enabled detection of an analyte through electrochemical impedance changes due to surface modifications (Das et al., 2011). Moreover, several fast and cost-effective diagnostic tests with significant sensitivity and specificity that are based on NMs, particularly on CNTs and graphene derivatives, have lately emerged



as a promising option for large-scale screening during COVID-19 pandemic (Mirzadeh-Rafie et al., 2023). These sensors target different biomarkers, including viral RNA, glycoproteins, and the spike (S) protein, and others. To achieve this, they rely on different detection strategies, such as immunoassays, SERS, or ultra-low-field nuclear magnetic resonance relaxometry, etc. While depending on the approach, the reported limits of detection vary extensively, ranging from ng to fg, or they are expressed as copies/mL to copies/ μ L, or in different manner (Mirzadeh-Rafie et al., 2023). It should be noted that CNMs are used not only in production of nanobiosensors, but also in other areas, such as filtration, protective materials, and others (Farmand et al., 2022).

*Nanotechnology-based strategies for protection and decontamination:
advanced protective clothes; photocatalytic decontamination nanomaterials*

While nanotechnology has brought significant progress in detection of biothreats, its application in protection against and decontamination of harmful agents is as just as vital. The nanoscale materials are widely exploited in the development of nano-enhanced protective equipment, where their unique properties contribute to improved filtration efficiency, durability, and resistance to hazardous biological agents, as seen in advanced respirators and protective clothes (De Luca et al., 2023; Abedinloo, Parvari, Cheraghi & Assari, 2025). NMs with improved surface area and reactivity, including nanocatalysts and adsorbents, as well as reactive NPs, are also considered useful for applications in numerous environmental areas, such as water purification, air quality improvement, soil remediation, biodiversity conservation, and waste management (Prince et al., 2025).

Personal Protective Equipment (PPE) is shown effective in CBRN scenarios when it is selected properly, well maintained, and correctly used in all potential exposures, as it represents the first line of defense between individuals and potentially lethal biothreats (Abedinloo, Parvari, Cheraghi & Assari, 2025). In this domain, nanotechnology offers a transformative advancement by enabling the design and fabrication of advanced materials with enhanced filtration, antimicrobial activity, and barrier properties. Compared to traditional filter media, which primarily rely on mechanical interception, and which are often insufficient in capturing the smallest viral and bacterial particles, especially those in the sub-micrometer range, due to large gaps between the fibers (on average 10-30 μ m), the *nanofibers*, form a complex, highly porous network with an extremely high surface-area-to-volume ratio and pore sizes at the nanoscale. PPE with nanofibers insures increased respiratory comfort, and high filtering properties as well as reduction of heat accumulation and fatigue of the wearer during long-term use (De Luca et al., 2023). The performances of nanofiber filters have been extensively studied during COVID-19 pandemic, as demonstrated in a study of Leung and Sun (2020). They tested electrostatically charged polyvinylidene fluoride (PVDF) nanofiber filters assembled in modules of 2, 4, and 6 layers, each containing 0.765 gm^{-2} of charged PVDF nanofibers and showed that these filters, whether charged or uncharged, can capture ambient aerosols ranging from 10 to 400 nm, including tiny droplets potentially containing SARS-Cov-2 particles (Leung & Sun, 2020). Besides nanofibers, other nanonstructures have been investigated and exploited to successfully block penetration and deactivate biological agents, as well as to ensure that PPE can be easily cleaned and reusable without losing their efficiency and safety, while still being environmentally friendly (De Luca et al., 2023). Among various types of nanoscale materials, the most used are NPs of Ag, copper (Cu), copper iodide, copper oxide (CuO), graphene, graphene oxide, and others (Lee et al., 2016; Abbasinia, Karimie, Haghighat & Mohammadfam, 2018; McCarthy, Gino, d'Entremont, Barari & Renouf, 2020). When incorporated into the fibrous matrix of masks and suits, these NPs provide strong antimicrobial properties by releasing ions that can disrupt the cellular membranes of bacteria and inhibit viral replication upon contact, effectively neutralizing the threat in high-risk environments where individuals may face exposure (De



Luca et al., 2023). In addition, smart, multifunctional protective materials coated with nanoscale hydrophobic layers that repel liquids, and prevent direct contact with contaminated aerosols or droplets are designed to be responsive to certain environmental signals, self-cleaned, and sterilized, which is essential for the safety of first responders and other personnel that are facing biothreats. Notable examples are PPE enhanced with graphene microfiber fabrics that are available on the market since the beginning of the COVID-19 pandemic (De Luca et al., 2023).

Hazardous agents are typically removed from the site by physical elimination, dissolution, or by their chemical and biological neutralization. Although effective, these traditional decontamination methods, often lacking selectivity, demand the massive use of water, diluents and/or aggressive chemicals (sodium hydroxide, hypochlorites, peroxides, and others), can damage materials, and may pose risks to human health and the environment (Bhadra, Abdulkareem & Al-Thani, 2019). In the contrast, new, more proficient and faster decontamination approaches based on nanotechnology, introduce engineered solid catalytic materials with acidic, basic, or redox properties, high specific surface area (ca. $1000 \text{ m}^2\text{g}^{-1}$) and adsorption capacities, that can accelerate the breakdown or capture of hazardous agents in air, water, soil and other surfaces under mild conditions like room temperature. Therefore, they are promising substitutes to conventional methods including thermal destruction, incineration, and other methods (Kumar, 2005). The key nano-based decontamination strategies utilize a variety of materials and approaches. Commonly employed materials are: zero-valent iron NPs; metal oxide NPs such as Ag, Cu, and titanium dioxide (TiO_2); as well as carbon-based materials including CNTs and graphene-based NPs (Rezania et al., 2024). Frequently applied methods encompass nano-adsorbents for contaminant removal, nanofiltration membranes for separation, and nanophotocatalysis, that generate reactive oxygen species (ROS) to rapidly break down organic contaminants, including microorganisms and toxins (Bhadra et al., 2019). Additional methods involve nano-biocides and antimicrobials which eliminate or inhibit the growth of pathogens, as well as nano-bioremediation, where NMs enhance the activity of microorganisms that break down pollutants or act as carriers to distribute microbes to contaminated sites (Ningthoujam et al., 2022). For example, upon the exposure to light, ultraviolet (UV) or visible light in some cases, TiO_2 photocatalyst provokes mass production of ROS that in return damage RNA, proteins, or other viral, bacterial or fungi particles, as well as specific toxins, leading to their inactivation and degradation (De Pasquale et al., 2020). As demonstrated in the study of Lu and coworkers (2022), a TiO_2 -coated glass sheet inactivated 99.9% of SARS-CoV-2 in aerosols in a short time (within 20 min) (Lu et al., 2020). Additionally, metal-organic frameworks, including those in “nanosponge” form, are novel highly porous crystalline materials with high surface area, and diverse functionalities that trap and/or catalytically degrade a wide range of toxins and pathogens among other pollutants (Karmakar, Velasco & Li, 2022; Mishra et al., 2023).

Nanomedicine and therapeutic interventions: targeted therapy, drug delivery, tissue repair

Nanomedicine is fast-developing interdisciplinary field that combines nanotechnology with medical and pharmaceutical sciences, advancing detection, diagnosis, prevention, and treatment of diseases (Haleem, Javaid, Singh, Rab & Suman, 2023). It employs engineered nanoscale structures, devices, and systems that interact with biomolecules (proteins, DNA, cell membranes, etc.) to provide transformative solutions, approaches and strategies to healthcare, including applications relevant to CBRN defense, such as targeted therapy, drug delivery, tissue repair, and other (Haleem et al., 2023; Singh et al., 2024; Kurul et al., 2025). As sustainable and biocompatible alternatives to conventional methods, NMs and nanorobots have the potential to lower toxicity, improve patient safety and effectiveness of treatments (Singh et al., 2024).



Targeted therapy and drug delivery systems showed promising in the treatment of various diseases, including cancer, neurological disorders, cardiovascular, and infectious diseases, since they are more bioavailable, have negligible off-target side effects and optimal drug efficacy when compared to traditional therapeutic agents (Boppana et al., 2024). By binding or encapsulating versatile therapeutic agents like hydrophilic and hydrophobic drugs, small molecules, peptides, proteins, or nucleic acids in the bloodstream, these systems protect medications from enzymatic degradation and premature clearance, and selectively direct them to specific sites within the body. They can also be engineered to respond to external or internal stimuli such as pH, temperature, light, or magnetic fields, thereby enabling controlled release at the level of target cells, tissues, or organs (Emeihe, Nwankwo, Ajegbile, Olaboye, & Maha, 2024). These nanoscale engineered platforms can be classified in several ways, with most common grouping according to materials composition: **organic** (liposomes, polymeric NPs, dendrimers, micelles, exosomes/nanovesicles, etc.), **inorganic** (AuNPs, AgNPs, iron oxide NPs, silica NPs, QDs, and others), and **carbon-based systems** (CNTs, and graphene oxide, etc.) (Boppana et al., 2024; Emeihe et al., 2024; Tenchov et al., 2025). Each class possesses unique physicochemical properties that dictate its behavior, biocompatibility, and suitability for specific clinical applications. According to the mechanism by which NPs reach and accumulate at the target site, they can also be divided into passive or active targeting systems. Table 1 lists characteristics of passive and active targeting systems, each with distinct mechanisms, applications, advantages and limitations, as well as examples (Mok & Zhang, 2013; Barua & Mitragotri, 2014; Kumar, 2025; Clemons et al., 2018; Afrasiabi, Pourhajabagher, Raoofian, Tabar zad, & Bahador, 2020; Zhou, Krishnan, Jiang, Fang & Zhang, 2021; Singh et al., 2024; Tenchov et al., 2025, <https://insidetx.com/review/a-comprehensive-review-of-passive-and-active-nanoparticle-targeting-technics/>).

Alternative classification can further be made, such as classification by structural morphology (e.g., solid NPs, hollow vesicles, and spherical micelles), and design strategies (like hybrid (lipid-polymer hybrids, organic/inorganic core-shell systems, multifunctional composites, etc.) and natural-based (protein-based nanocarriers, polysaccharide-based nanocarriers, biomimetics, etc.)), each offering additional ways to describe the versatility of these systems (Patra et al., 2018; Egwu et al., 2024; Tenchov et al., 2025).

Traditional approaches for restoration or replacement of damaged tissue and organs, utilize grafts, scaffolds, or cell transplantation with lot of limitations, such as immune rejection, poor integration, or partial functional recovery. To address these issues, nanotechnology offers innovative solutions and approaches for tissue repair and regenerative medicine by creating biomimetic scaffolds that replace tissue functions; filling up the space until the damaged tissue is regenerated; acting as carriers for drugs and growth factors, and guiding stem cell behavior for tissue ingrowths (Peran et al., 2013). *Nanostructured scaffolds* are 3D frameworks that mimic the natural extracellular matrix and provide a supportive milieu for cell adhesion, proliferation, and differentiation while optimizing porosity, mechanical strength, and flexibility. When functionalized with bioactive molecules, they can further boost regenerative outcomes, and reduce fibrotic responses, improve antimicrobial activity, and even deliver local biochemical signals, creating an environment that resembles natural tissue. In contrast, nanosensors combined with scaffolds ensure real-time monitoring of the healing process, by detecting changes in pH, oxygen levels, or the expression of specific biomarkers, allowing dynamic adjustment of therapeutic interventions and improving overall treatment outcomes. Commonly used NMs for their designing are: electrospun nanofibers, hydrogel-based nanocomposites, and carbon-based (Liang, Hsiao & Chu, 2007; Arora et al., 2012; Barrett-Catton, Ross & Asuri, 2021; Hajishoreh et al., 2023). The use of nanocarriers in this field is mainly focused on delivery systems where they directly transport genetic material, drugs, growth factors or other biomolecules to injury site and release them in controlled manner (Dadfar et al., 2019; Gao et al., 2024). Importantly, stem cell nanotechnology, a



synergistic platform, creates a multifunctional, precisely controlled regenerative microenvironment, supports targeted tissue repair, upgrades therapeutic efficacy, and the development of personalized regenerative strategies. This is accomplished by integrating stem cells capacity for self-renewal, differentiation into tissue-specific lineages, and secretion of regenerative factors, with nanoscale signals, functionalized NPs, and scaffold surface patterns, which guide stem cell behavior, enhance tissue integration and functional recovery. Studies have showed that mesenchymal stem cells on nanocomposite scaffolds can accelerate bone formation and mineralization, while induced pluripotent stem cells combined with conductive NMs promote cardiac repair. Similarly, neural stem cells guided by nanofiber scaffolds are able to enhance axonal regeneration, and NPs-enhanced hydrogels with stem cells stimulate angiogenesis and epithelialization in skin and wound healing (Arora et al., 2012; Samuel, Sundarraj & Sudarmani, 2023).

Table 1: *Characteristics of passive and active nano-drug delivery systems*

Approach	Passive targeting	Active targeting
Mechanism	Uses natural physiological or pathological processes (e.g., enhanced vascular permeability, leaky vasculature, or the enhanced permeability and retention effect)	Uses ligand-receptor interactions for specific binding
Nanocarrier modification	Usually unmodified or minimal	Functionalized with ligands (antibodies, peptides, aptamers, etc.)
Target specificity	Moderate, depends on tissue pathophysiology	High, directed by ligand-receptor recognition
Application	Liposomes or polymeric NPs that accumulate in organs commonly affected by toxins or pathogens (e.g., liver or lungs) due to enhanced permeability Solid lipid NPs for sustained delivery of antiviral drugs against aerosolized viruses Superparamagnetic iron oxide NPs for drug/gene/cell delivery	Antibody/aptamer-conjugated NPs designed to bind specifically to bacterial toxins, like BoNT Ligand-functionalized nanocarriers that recognize viral surface proteins (e.g., SARS-CoV-2 S protein) to deliver antiviral therapeutics directly to infected cells Nanocarriers with antidotes targeted to receptors expressed on cells exposed to chemical warfare agents
Advantages	Simple design, easier to produce	High precision, reduces off-target effects, controlled release possible
Limitations	Less specific, potential for systemic distribution	More complex design, higher cost, potential immunogenicity
Examples	NPs accumulating in tumors or inflamed tissue	Antibody-conjugated liposomes targeting specific cancer cells

Antimicrobial NMs and nanovaccines are rapidly developing and promising nanotechnology-based strategies for prevention and treatment of infection diseases. *Antimicrobial NMs* show great potential in direct interaction with pathogens through multiple mechanisms, including direct rapturing of microbial walls and membranes, interfering with DNA replication and protein synthesis, generating ROS,



and controlling release of antimicrobial ions which not only inhibit microbial growth but also prevent the formation of persistent biofilms. Different NMs, including those based on zinc oxide, Ag, CuO, and carbon, are among the most extensively studied due to their chemical stability, ease of production, tunable physical properties, and compatibility with a wide range of biomedical materials and formulations. Moreover, polymer-based nanostructures offer the added advantage of tunable functionality and improved biocompatibility. These nanodrugs can be used independently or in combination with traditional drugs (Mondal, Chakraborty, Manna & Mandal, 2024). In contrast, *nanovaccines* exploit NPs as carriers of antigens that enhance the stability, and bioavailability of antigens. These systems provoke stronger and prolonged both innate and adaptive immune responses against bacterial and viral pathogens with minimal side effects compared with conventional formulations. They also enable co-delivery of adjuvants and multiple antigens within a single nanocarrier, improving vaccine efficacy (Das & Ali, 2021; Ross et al., 2024). Moreover, their versatility allows rapid adaptation to emerging pathogens, which is a critical advantage in the dynamic CBRN landscape (Manju et al., 2023).

*Ethical, safety and misuse concerns: dual-use technology and
weaponization, health and environmental risks*

The widespread applications of nanotechnology across diverse fields like medicine, environmental remediation, consumer products, and CBRN defense, have brought transformative opportunities, but they simultaneously introduced complex ethical, safety, and misuse challenges. Although many forms of nanoscale engineered materials, nanosystems, or devices, are developed for beneficial applications, such as targeted drug delivery, regenerative medicine, precision imaging, and diagnostics, their unique properties make them suitable for deliberate misapplication. Their small size, high surface reactivity, and ability to cross biological barriers could be exploited for malicious purposes, including delivering toxic agents, creating novel biochemical weapons, or designing nanostructures that evade medical countermeasures (Kosal, 2010). For instance, nanostructures could be engineered into aerosolized delivery systems capable of dispersing toxins or pathogens with controlled release, enhanced stability and persistence in the environment (Snow & Giordano, 2019). They could also act as stealth coatings for existing threats, prolonging their circulating time and stability, as well reducing detectability by immune system, which could be used to camouflage the presence of harmful agents in malicious applications (Vignesh, Menaka, Amal, Selvakumar & Vasanth, 2025). Their capacity for controlled release and surface modification show potential for designing highly specific and potentially lethal nanocarriers and capsules, without distinguishing the line between therapeutic innovation and weaponization (Kosal, 2010). Such dual-use scenarios emphasize the necessity for robust ethical oversight in research and development, appropriate mitigation strategies and international security frameworks, so the potential of nanotechnology can be responsibly harnessed to benefit society, human health, and overall well-being (Kosal, 2010; Vaseashta, 2025; Vignesh et al., 2025).

Due to smaller size, higher surface-to-volume ratio and potential for bioaccumulation, NMs can interact with biological systems in ways that their larger-scale counterparts do not. This often leads to unpredictable behaviors and toxicological effects that require entirely new approaches of study. For this reason, various research methods have been applied to address the safety issues related to NMs application and misapplication, as well as environmental and human health concerns associated with their intentional or accidental release. Computer simulations, *in vitro* cell cultures models, and *in vivo* animal studies, have been used to uncover potential threats, investigate the mechanisms associated with NMs toxicity (like oxidative stress, apoptosis, inflammation, and organ-specific toxicity), and to evaluate potential risks from different exposure scenarios (Todorović et al., 2024; Vignesh et al., 2025).



Current solutions and strategies primarily involve risk management and the establishment of effective regulatory frameworks to minimize the potential of NMs on health and the environment. Various research institutions, organizations, and worldwide regulatory agencies, like the United States Food and Drug Administration (USFDA), European Medicines Agency (EMA), and Environmental Protection Agency (EPA) have proposed regulatory guidelines for assessing the NMs cyto/geno/immunotoxicity, pharmacokinetics, environmental impact, and necessities for labeling and reporting their side effects (Vignesh et al., 2025). The real and multifaceted risks of nanotechnology are complicated as current guidelines are still evolving and remaining regionally fragmented, rather than being globally synchronized. Therefore, strengthening international cooperation, harmonizing testing protocols, and ensuring transparent communication are essential to guide the responsible use of nanotechnology, protect human health and the environment, and prevent the exploitation of these innovations for hostile purposes.

CONCLUSION

The history of CBRN agents, particularly biological, illustrates both their legitimate applications and their potential for deliberate misuse. Although the use of certain agents has clearly been beneficial, their destructive capacity emphasizes the need for resilient regulatory frameworks and international cooperation to prevent abuse.

The rise of nanotechnology, including NMs, devices and nanosystems with specific properties, offers new possibilities for strengthening our defenses against biothreats. By improving detection and decontamination processes, medical interventions, enhancing protective technologies, and supporting overall public health preparedness, the innovations, approaches and strategies based on nanotechnology provide significant benefits across multiple domains. However, their dual-use nature requires careful evaluation, since the same properties that make them valuable for defense could also be exploited with malicious intent. A balanced multifaceted approach, which integrates safety, ethical considerations, and transparency, is essential to safeguard public health and security while simultaneously mitigating the risks of its misuse. To address the complex challenges and potential risks associated with biological agents and emerging nanotechnologies, the global collaboration between scientific communities, policymakers, and international organizations is crucial to developing effective and ethical solutions.

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OVERVIEW OF NATURAL AND ARTIFICIAL RADIOACTIVITY DOSIMETRY AND ACTIVITY MEASUREMENT METHODS, USEFUL FOR FORENSIC PURPOSES

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ABSTRACT

Purpose: The primary purpose of this study is to review the mechanism of exposure to ionizing radiation through different pathways with a focus on both external and internal exposure scenarios. By reviewing the methods for examining the behavior and distribution of natural and artificial radionuclides in different matrices, the research aims to examine the forensic relevance of radiation dose assessment and its application in identifying sources and situations of exposure using radiation detection methods. The use of radiation detectors and dosimetry methods ensures accurate detection and analysis, making the results applicable to radiation protection.

Design/Methods/Approach: This paper presents a review of dosimetry quantities that can be derived from radionuclide concentration data in various matrices. The focus is placed on understanding the relationship between radionuclide activity concentrations and the calculation of key dosimetry quantities, including absorbed dose, equivalent dose, and effective dose. The approach involves reviewing existing methodologies and mathematical models used for dose estimation based on internal and external exposure scenarios and their applicability to the forensic studies. No original measurements were performed; this paper is a methodological review.

Findings: Various dosimetry quantities, such as absorbed dose, equivalent dose, and effective dose, can be estimated based on radionuclide activity concentrations in different media. These quantities are essential for assessing both external and internal exposure to ionizing radiation. This framework enables dose assessments based on contamination data. The findings underline the importance of combining radiological measurements with dose modeling tools in order to support health risk assessment.

Originality/Value: This paper provides a structured overview of how key dosimetry quantities can be determined from radionuclide concentration data, without direct dosimetry measurements, and emphasizes the role of nuclear techniques and dose assessment methodologies as fundamental tools in

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forensic analysis in the context of radiological or nuclear emergencies. This study provides a valuable reference for professionals involved in dose assessment and ionizing radiation protection.

Keywords: exposure to ionizing radiation, dosimetric quantities, radiation detectors, NORM.

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INTRODUCTION

The naturally occurring sources of radiation are cosmic radiation and primordial radioactive elements that were created when the Earth was born about 4.5 billion years ago. Concentrations or quantities of naturally occurring radioactive material of sufficient activity to be of interest are known by the acronym NORM (Cember and Johnson, 2009).

The general population can be exposed to the natural levels of radiation that are mainly terrestrial in origin, belonging to the uranium and thorium series and ^{40}K in the soil. Many industrial processes (such as ore and oil mining, the building industry, etc.) contribute to the so-called technologically enhanced natural radioactivity, which means that the radionuclides present in the raw materials are concentrated in the final product or the waste. Discarding these products in the environment can cause, as a consequence, the exposure of the public to the ionizing radiation (Janković et al., 2023).

Cosmic radiation consists of high-energy particles originating from the processes in the Sun and other parts of our galaxy (UNCEAR, 2022). For the most part, these particles are filtered by the magnetic field of the Earth. However, one part reaches the atmosphere, where it can interact with the elements present in the upper layers (N_2 , O_2 , Ar and others) or even reach the surface of the Earth. Examples of isotopes produced in the interaction of cosmic radiation with the elements present in the atmosphere are ^7Be , ^3H , and ^{14}C .

Artificial radionuclides are present in our everyday life due to their usage in medicine as a part of radiation therapy or diagnostics (short-lived radionuclides used in a controlled manner and regulated by Rulebooks and Practice Guides) and as a consequence of nuclear accidents and nuclear weapon tests in the past (presence of some long-lived radionuclides such as ^{137}Cs and ^{90}Sr in the environment).

To quantify the potential exposure to individuals in surrounding areas, such contributions to radiation levels are typically assessed through the measurement of ambient dose equivalent rate, which reflects the external radiation field relevant to human exposure at or near site boundaries. Also, by knowing the baseline values through systematic and continuous monitoring, recognizing the events that are out of scope of normal operations is possible. In case of the unplanned release of radionuclides in the environment, methods used for monitoring are the first that can provide the warning results (Dimović et al., 2024). It is then possible to backtrack the obtained results both in time and space, which enables us to reach a conclusion about the nature of the release.



COMPONENTS OF A COMPREHENSIVE RADIATION PROTECTION PROGRAM

A well-structured radiation protection program includes several key elements to ensure regulatory compliance and worker safety in environments involving ionizing radiation:

- Personal dosimetry monitoring – covering both external and, when necessary, internal radiation doses.
- Routine surveys and area monitoring are performed to assess and document ambient radiation levels, potential contamination by radioactive materials, and to evaluate the likelihood of worker exposure.
- Radioactivity control, including control of goods at border crossings during import, export, and transit and the procedure of using monitors and intervention procedures in the case of illicit trafficking of radioactive and nuclear materials across the border (Official Gazette of RS, No. 86/19).
- Worker training on radiation protection, including health effects associated with radiation dose and radiation protection procedures and controls to minimize dose and prevent contamination. Use of ionizing radiation in various fields of application: medicine, veterinary medicine, industry, agriculture, and scientific research; supplementary training for work with sealed and unsealed sources of ionizing radiation and with devices that generate ionizing radiation; training of personnel responsible for the implementation of radiation protection measures. Periodic renewal and updating of knowledge.
- Emergency preparedness procedures are established to ensure timely identification and effective response to radiological emergencies. Advanced knowledge and essential skills necessary for effectively addressing complex challenges and threats in the field of Chemical, Biological, Radiological, and Nuclear (CBRN) safety and security.

Operations involving exposure to ionizing radiation should be designed so any unnecessary exposure should be avoided, and all exposures shall be kept as low as reasonably achievable (ALARA) (Cember and Johnson, 2009).

DEFINITIONS OF DOSIMETRY QUANTITIES

The dose calculation equations are based on two types of exposure to radiation: external and internal exposure. The first type of exposure is resulting from radioactive sources external to the body. Internal radiation exposure occurs when radioactive material is taken into the body. This can happen through inhalation of contaminated air or ingestion of food and water containing radioactive substances. Once inside the body, the radioactive material becomes an internal source of radiation, continuously exposing tissues to radiation until it either decays naturally or is eliminated through biological processes such as excretion or metabolic activity.

The effects of the exposure are classified into categories – stochastic effects and deterministic effects, taking into account the probability of appearance; somatic and genetic effects, according to the part of the body or cells where the effects can be detected; and acute and late effects, taking into account the time passed between the exposure and the effect (Cember and Johnson, 2009).

The appearance of some radiation effects on the biological systems can provide an insight into the timeline of the events leading to the expression of the said effects and thus contribute to the reconstruction of the unwanted event.



Absorbed Dose (D)

Absorbed dose (D) is the amount of energy absorbed per unit mass (Official Gazette of RS, Nos. 86/2011 and 50/2018).

$$D = \frac{dE}{dm} \quad (1)$$

where dE is the mean energy of ionizing radiation transferred to matter per volume element and dm is the mass of matter contained in that volume element. The unit of absorbed dose is the gray [Gy].

Exposure Dose (X)

It refers to the ionization of air caused by X-rays or gamma radiation. It is defined as the amount of electric charge of ions of one sign produced by X-ray or gamma radiation in air per unit mass of air. The unit of exposure dose is [C/kg].

Equivalent Dose, $H_{T,R}$

The equivalent dose $H_{T,R}$ takes into account the fact that the effects of ionizing radiation on a specific tissue or organ depend not only on the amount of energy absorbed per unit mass but also on the type of radiation. It is defined as the product of the average absorbed dose in tissue or organ T, delivered by radiation type R, and the corresponding radiation weighting factor W_R . The unit of equivalent dose is [Sv] (Official Gazette of RS, Nos. 86/2011 and 50/2018).

$$H_{T,R} = D_{T,R} W_R \quad (2)$$

If the radiation consists of multiple types of radiation with different W_R values, then the total equivalent dose is:

$$H_T = \sum D_{T,R} W_R \quad (3)$$

The radiation weight factor, W_R , is a dimensionless factor that expresses the difference in biological effects of different types of ionizing radiation. Radiation weighting factor values for different types and energies of radiation are given in Table 1 (Official Gazette of RS, Nos. 86/2011 and 50/2018).

Table 1: Radiation weight factors.

Radiation type and energy range	Radiation weight factor W_R
Photons, of all energies	1
Electrons and muons, all energies 1	1
Neutrons, energy below 10 keV	5
Neutron energy from 10 to 100 keV	10
Neutrons, from 100 keV to 2 MeV	20
Neutrons, from 2 MeV to 20 MeV	10
Neutrons, energy higher than 20 MeV	5
Protons, except for recoil protons, with energies higher than 2 MeV	5
Alpha particles, fission fragments, heavy nuclei	20



Effective Dose (E)

Effective dose depends on the type of irradiated tissue or organ. The same equivalent dose will represent a different risk for the possible development of the disease on different organs. Therefore, when assessing the damage caused by ionizing radiation to various organs, the equivalent dose is multiplied by the tissue weighting factor, W_T , resulting in the effective dose. The unit of effective dose is [Sv].

$$E = \sum H_T W_T \quad (4)$$

The total effective dose is obtained by adding the effective dose that comes from exposure to external radiation and from the radiation of radionuclides introduced by ingestion and inhalation (Official Gazette of RS, Nos. 86/2011 and 50/2018):

$$E = E_s + \sum_j e(g)_{j,ing} I_{j,ing} + \sum_j e(g)_{j,inh} I_{j,inh} \quad (5)$$

where: E_s is the contribution of external radiation to the total effective dose; $e(g)_{j,ing}$ and $e(g)_{j,inh}$ are expected effective doses per unit intake of radionuclide j ingested by food or inhalation for an individual in age group g ; $I_{j,ing}$ and $I_{j,inh}$ are the corresponding activities of radionuclides introduced through food or inhalation.

The ingestion dose assessment takes into account the concentrations of individual radionuclides in water or food, the amount consumed on an annual basis, and dose coefficients. (Clement 2012). The dose coefficients for ^{226}Ra , ^{90}Sr and their decay products that are involved in dose calculation are given in Table 2.

Table 2: Dose coefficients for ^{226}Ra , ^{90}Sr and their decay products for different age groups (Clement 2012).

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Table F.1. (continued)

Nuclide	T _{1/2}	Infant		f ₁	e (Sv/Bq)				
		f ₁	e (Sv/Bq)	≥1 year	1 year	5 years	10 years	15 years	Adult
Strontium									
Sr-80	100 m	0.6	3.7E-09	0.4 [*]	2.3E-09	1.1E-09	6.5E-10	4.2E-10	3.4E-10
Sr-81	25.5 m	0.6	8.4E-10	0.4 [*]	4.9E-10	2.4E-10	1.4E-10	9.6E-11	7.7E-11
Sr-82	25.0 d	0.6	7.2E-08	0.4 [*]	4.1E-08	2.1E-08	1.3E-08	8.7E-09	6.1E-09
Sr-83	32.4 h	0.6	3.4E-09	0.4 [*]	2.7E-09	1.4E-09	9.1E-10	5.7E-10	4.9E-10
Sr-85	64.84 d	0.6	7.7E-09	0.4 [*]	3.1E-09	1.7E-09	1.5E-09	1.3E-09	5.6E-10
Sr-85m	69.5 m	0.6	4.5E-11	0.4 [*]	3.0E-11	1.7E-11	1.1E-11	7.8E-12	6.1E-12
Sr-87m	2.805 h	0.6	2.4E-10	0.4 [*]	1.7E-10	9.0E-11	5.6E-11	3.6E-11	3.0E-11
Sr-89	50.5 d	0.6	3.6E-08	0.4 [*]	1.8E-08	8.9E-09	5.8E-09	4.0E-09	2.6E-09
Sr-90	29.12 y	0.6	2.3E-07	0.4 [*]	7.3E-08	4.7E-08	6.0E-08	8.0E-08	2.8E-08
Sr-91	9.5 h	0.6	5.2E-09	0.4 [*]	4.0E-09	2.1E-09	1.2E-09	7.4E-10	6.5E-10
Sr-92	2.71 h	0.6	3.4E-09	0.4 [*]	2.7E-09	1.4E-09	8.2E-10	4.8E-10	4.3E-10
Yttrium									
Y-86	14.74 h	0.001	7.6E-09	0.0001	5.2E-09	2.9E-09	1.9E-09	1.2E-09	9.6E-10
Y-86m	48 m	0.001	4.5E-10	0.0001	3.1E-10	1.7E-10	1.1E-10	7.1E-11	5.6E-11
Y-87	80.3 h	0.001	4.6E-09	0.0001	3.2E-09	1.8E-09	1.1E-09	7.0E-10	5.5E-10
Y-88	106.64 d	0.001	8.1E-09	0.0001	6.0E-09	3.5E-09	2.4E-09	1.6E-09	1.3E-09
Y-90	64.0 h	0.001	3.1E-08	0.0001	2.0E-08	1.0E-08	5.9E-09	3.3E-09	2.7E-09
Y-90m	3.19 h	0.001	1.8E-09	0.0001	1.2E-09	6.1E-10	3.7E-10	2.2E-10	1.7E-10
Y-91	58.51 d	0.001	2.8E-08	0.0001	1.8E-08	8.8E-09	5.2E-09	2.9E-09	2.4E-09
Y-91m	49.71 m	0.001	9.2E-11	0.0001	6.0E-11	3.3E-11	2.1E-11	1.4E-11	1.1E-11
Y-92	3.54 h	0.001	5.9E-09	0.0001	3.6E-09	1.8E-09	1.0E-09	6.2E-10	4.9E-10
Y-93	10.1 h	0.001	1.4E-08	0.0001	8.5E-09	4.3E-09	2.5E-09	1.4E-09	1.2E-09
Y-94	19.1 m	0.001	9.9E-10	0.0001	5.5E-10	2.7E-10	1.5E-10	1.0E-10	8.1E-11
Y-95	10.7 m	0.001	5.7E-10	0.0001	3.1E-10	1.5E-10	8.7E-11	5.9E-11	4.6E-11



Polonium									
Po-203	36.7 m	1.0	2.9E-10	0.5	2.4E-10	1.3E-10	8.5E-11	5.8E-11	4.6E-11
Po-205	1.80 h	1.0	3.5E-10	0.5	2.8E-10	1.6E-10	1.1E-10	7.2E-11	5.8E-11
Po-207	350 m	1.0	4.4E-10	0.5	5.7E-10	3.2E-10	2.1E-10	1.4E-10	1.1E-10
Po-210	138.38 d	1.0	2.6E-05	0.5	8.8E-06	4.4E-06	2.6E-06	1.6E-06	1.2E-06
Astatine									
At-207	1.80 h	1.0	2.5E-09	1.0	1.6E-09	8.0E-10	4.8E-10	2.9E-10	2.4E-10
At-211	7.214 h	1.0	1.2E-07	1.0	7.8E-08	3.8E-08	2.3E-08	1.3E-08	1.1E-08
Francium									
Fr-222	14.4 m	1.0	6.2E-09	1.0	3.9E-09	2.0E-09	1.3E-09	8.5E-10	7.2E-10
Fr-223	21.8 m	1.0	2.6E-08	1.0	1.7E-08	8.3E-09	5.0E-09	2.9E-09	2.4E-09
Radium									
Ra-223	11.434 d	0.6	5.3E-06	0.3 ^{††}	1.1E-06	5.7E-07	4.5E-07	3.7E-07	1.0E-07
Ra-224	3.66 d	0.6	2.7E-06	0.3 ^{††}	6.6E-07	3.5E-07	2.6E-07	2.0E-07	6.5E-08
Ra-225	14.8 d	0.6	7.1E-06	0.3 ^{††}	1.2E-06	6.1E-07	5.0E-07	4.4E-07	9.9E-08
Ra-226	1600 y	0.6	4.7E-06	0.3 ^{††}	9.6E-07	6.2E-07	8.0E-07	1.5E-06	2.8E-07
Ra-227	42.2 m	0.6	1.1E-09	0.3 ^{††}	4.3E-10	2.5E-10	1.7E-10	1.3E-10	8.1E-11
Ra-228	5.75 y	0.6	3.0E-05	0.3 ^{††}	5.7E-06	3.4E-06	3.9E-06	5.3E-06	6.9E-07
Lead									
Pb-195m	15.8 m	0.6	2.6E-10	0.4 ^{††}	1.6E-10	8.4E-11	5.2E-11	3.5E-11	2.9E-11
Pb-198	2.4 h	0.6	5.9E-10	0.4 ^{††}	4.8E-10	2.7E-10	1.7E-10	1.1E-10	1.0E-10
Pb-199	90 m	0.6	3.5E-10	0.4 ^{††}	2.6E-10	1.5E-10	9.4E-11	6.3E-11	5.4E-11
Pb-200	21.5 h	0.6	2.5E-09	0.4 ^{††}	2.0E-09	1.1E-09	7.0E-10	4.4E-10	4.0E-10
Pb-201	9.4 h	0.6	9.4E-10	0.4 ^{††}	7.8E-10	4.3E-10	2.7E-10	1.8E-10	1.6E-10
Pb-202	3E5 y	0.6	3.4E-08	0.4 ^{††}	1.6E-08	1.3E-08	1.9E-08	2.7E-08	8.8E-09
Pb-202m	3.62 h	0.6	7.6E-10	0.4 ^{††}	6.1E-10	3.5E-10	2.3E-10	1.5E-10	1.3E-10
Pb-203	52.05 h	0.6	1.6E-09	0.4 ^{††}	1.3E-09	6.8E-10	4.3E-10	2.7E-10	2.4E-10
Pb-205	1.43E7 y	0.6	2.1E-09	0.4 ^{††}	9.9E-10	6.2E-10	6.1E-10	6.5E-10	2.8E-10
Pb-209	3.253 h	0.6	5.7E-10	0.4 ^{††}	3.8E-10	1.9E-10	1.1E-10	6.6E-11	5.7E-11
Pb-210	22.3 y	0.6	8.4E-06	0.4 ^{††}	3.6E-06	2.2E-06	1.9E-06	1.9E-06	6.9E-07
Pb-211	36.1 m	0.6	3.1E-09	0.4 ^{††}	1.4E-09	7.1E-10	4.1E-10	2.7E-10	1.8E-10
Pb-212	10.64 h	0.6	1.5E-07	0.4 ^{††}	6.3E-08	3.3E-08	2.0E-08	1.3E-08	6.0E-09
Pb-214	26.8 m	0.6	2.7E-09	0.4 ^{††}	1.0E-09	5.2E-10	3.1E-10	2.0E-10	1.4E-10

DOSE AND ACTIVITY MEASUREMENT METHODS AND FORENSIC APPLICATION

Dosimetric Measurements

Dosimetry values are measured using passive dosimetry (thermoluminescent dosimeters TLD and optically stimulated luminescent dosimeters OSL) in stationary mode, ionizing chambers (mainly in a laboratory environment), or with various portable dosimeters and radiation monitors such as Geiger-Muller (GM) probes or scintillation probes.

Passive dosimeters are mainly used in stationary mode, exposed for a predefined period of time, and as such, can serve to monitor the cumulative dose and have limited possibility to determine the direction of the radiation. For example, TLD as well as other types of passive dosimeters can be used for the measurement of the total absorbed dose received by the walls of a container for detecting the prior presence of a radioactive material. By simultaneously considering both the accumulated dose on the walls of containers and the type and amount of the radioactive material producing that dose, rather unique information regarding the history of an interdicted or unknown sample might be uncovered (Schwantes et al., 2009). More recently, a broad variety of retrospective dosimetry problems were published: the telephone chip cards and electronic components of portable electronic devices such as cell phones, pagers, and digital watches are considered for dose reconstruction using TLD and OSL techniques (Göksu, 2003; Inrig et al., 2008; Beerten et al., 2009). Namely, the surface-mounted components of electronic devices, such as resistors, surface-mounted capacitors and diodes, inductors, integrated circuits, smart chip cards including subscriber identification module (SIM) cards, glasses,



and displays produce material-specific TL and OSL responses, from which the dose absorbed by the given component can be estimated.

Portable instruments have a probe (GM tube or scintillation material) that is able to give a readout of the absorbed dose immediately, and they can be hand-held. The typical range of portable instruments is 0.1 μSv to 1 mSv, and they are sensitive to gamma and beta radiation of various energies, depending on the model and material of the probe. The main advantage is that they are portable, enabling the operator to detect the presence of an ionizing radiation source or contamination in the specific direction or on the specific surface. For forensic purposes, this type of instruments serves for locating the source of ionizing radiation as well as contamination caused by the presence of the source at some point (provided that the source contains unbound radioactive material). Thus, it can be used for searching for radioactive material in transportation vehicles or at borders as well as detecting radioactive contaminants in environmental samples. Also, it can be used to distinguish the contamination resulting from the nuclear accident from the other scenarios, since the contaminants released in the accident (main contribution is ^{137}Cs) will lead to a slower radioactive decay compared to, for example, a normal reactor shutdown, which is dominated by ^{60}Co (Marques, 2021).

Measurement of the Activity Concentration

For the measurement of gross alpha and gross beta radiation, gas-proportional counters are mainly in use. The principle of the detection is the ionization of the gas mixture. This type of detector is useful for the screening measurements, giving fast results without identification of the particular elements present in the measured samples (Janković et al., 2015; Sarap et al., 2024). In cases involving nuclear materials, this method is a standard part of the initial radiological survey to get baseline data on the radioactivity level as well as an estimation of the level of contamination. A high gross alpha and gross beta measurement result prompts using other specific detection methods to identify the exact radionuclides that are present and their quantities. This type of measurement is particularly useful in analyzing drinking water or surface waters since it is capable of producing fast results as an indication of a non-planned nuclear event. Also, by measuring air samples shortly after collection and monitoring the decay rate, typically within hours of sampling, anomalies such as a sharp rise in activity can serve as an indicator of a radiological release or incident. Also, the correlation of measured alpha and beta activities can be informative. A positive correlation indicates a common or related source of alpha- and beta-emitting radionuclides, while any discrepancy from the positive correlation should be investigated.

Liquid scintillation spectrometers (LSCs) contain a liquid substance that is excited in the interaction with the ionizing radiation. In this type of measurement, distinct alpha- or beta-emitting radionuclides can be detected and their concentration quantified (Todorović, Nikolov, and Stojković, 2018). The great sensitivity and precision of LSCs make them the best choice for the detection of trace amounts of radionuclides, especially those that emit low-energy beta particles. LSCs are used, among others things, for the measurement of ^{14}C concentration in the sample, which serves for the determination of the age of a sample – carbon dating, which is readily used in various forensic applications. The low detection limit for ^3H is favorable for the determination of the age and status of underground water bodies and water tables, thus enabling us to determine whether the underground water body was exposed to the outside environment. Also, it serves to follow the concentration of ^3H and other reactor products in the effluents even when they are consequently diluted in rivers or streams. Also, it is used for radiolabeled material, especially biological material that can give insight into microbial activity beyond the limits of biomolecular analysis (Heuer et al., 2020).



For gamma-emitting radionuclides, gamma spectrometers are used (Krnetić et al., 2018). These spectrometers are capable of detecting a whole spectrum of gamma photons ranging from below 50 keV up to 3 MeV. The gamma spectrometry enables us to detect and quantify all gamma emitting radionuclides present in the sample in a single nondestructive measurement, which is its main advantage over other methods. The detectors in use can be semiconductor detectors (Krnetić et al., 2018), such as high purity germanium (HPGe) detectors and detectors containing doped semiconductor material such as Cadmium Telluride (CdTe), Cadmium Zinc Telluride (CZT), detector etc. Also, scintillation detectors such as NaI, CsI, BGO, or LYSO are very commonly used when high energy resolution is not required. By comparing the results obtained by gamma spectrometry to the baseline data, it can be concluded if the contamination has occurred. Every detection of artificial radionuclides in an environmental sample (excluding ^{137}Cs) can be an indication of an unplanned release.

Using state-of-the-art measurement methods such as mass spectrometry (Veljković et al., 2024; Veljković et al., 2025), it is possible to determine the isotopic ratio and thus obtain information regarding the origin of the detected radionuclides. Standard measurement methods such as gamma spectrometry and measurement of ^3H and ^{90}Sr , as well as ambient dose equivalent measurements, can give information on the local unplanned events, provided that the continuous monitoring of the environment is conducted.

The presence of ^{233}U can be a sensitive indicator that anthropogenic uranium has been blended with natural uranium. Furthermore, since it has a unique production pathway, ^{233}U can be used to distinguish different sources of anthropogenic uranium. In a previous study (Tumey et al., 2009), samples that were expected to contain only natural uranium were collected from a site with known anthropogenic contamination. The major uranium isotope ratios showed a deviation from natural values, indicating the presence of recycled uranium. The relative abundance of neutron activation products in the debris produced by a nuclear detonation can provide important clues as to the design and the materials used in a nuclear device. This information can be used for source attribution, which is essential to deterring nuclear weapon states from providing assistance to terrorist organizations (Straume et al., 2003).

The results of the examination support the response to the unauthorized use of these materials and help investigators make informed decisions regarding nuclear security. Using isotopic, chemical, and physical characteristics of nuclear and other material, together with related forensic evidence to include DNA, hair, fingerprints, tool marks, and explosive residues, nuclear forensics can potentially link samples of interest to people, places, and events (<https://www.iaea.org/topics/nuclear-forensics>).

CONCLUSION

This paper emphasizes the critical role of dose assessment in understanding the impact of ionizing radiation on human health. By analyzing how absorbed, equivalent, and effective doses can be derived from radionuclide concentration data in different media, the paper provides a theoretical foundation for evaluating both internal and external exposure scenarios. This study contributes to radiological risk evaluation, especially in cases where nuclear techniques must be applied. By combining the calculation and the measurement, we can estimate the pathways of the contamination or exposure of the individual. The discrepancy between the calculation and the measurement of the dosimetric values (where such measurements are possible) that cannot be explained by the normal propagation of the measurement uncertainty has to be taken into account as a possible indication of malpractice or deviation from the safety and security protocols. No original measurements were performed; this paper is a methodological review.



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A PERSPECTIVE ON EPOXY/GRAPHITE-BASED COMPOSITES FOR ELECTROMAGNETIC INTERFERENCE SHIELDING: FABRICATION AND APPLICATION IN SECURITY TECHNOLOGIES

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ABSTRACT

Purpose: The rapid advancement of technology brings numerous benefits, such as facilitating everyday processes in households, laboratories, and production environments. However, many modern electronic devices used in forensic laboratories and police units require electromagnetic compatibility for efficient operation. To overcome this challenge, an effective solution is the design of protective covers made from lightweight, high-efficiency composite materials.

Design/Methods/Approach: This study presents a method for modifying the surface of graphite particles by silver deposition and their implementation in epoxy-based composite materials. Graphite particles were treated with the prepared silver dispersion, while FESEM/EDS, XRF, and electrical conductivity analyses were conducted to assess the properties of the modified particles. The polymer characteristics were evaluated through viscosity determination and dynamic mechanical thermal analysis. The study examined how the mechanical properties of composites relate to the mass fraction of modified graphite particles and the effectiveness of electromagnetic interference shielding (EMI SE) in the X-band.

Findings: Analysis of the modified graphite particles revealed a significant concentration of elemental silver on graphite surfaces to improve electrical conductivity. Increasing the conductivity of particles contributes to the formation of a Faraday cage, which can find application in increasing the electromagnetic compatibility of electronic devices. The incorporation of the silver coating onto graphite particles' surface improved the physical and mechanical properties of the particles and composites. The average wave intensity attenuation increased by 21% with silver coating compared to samples without it.

Originality/Value: This paper presents a cost-effective method for modifying the surface of graphite particles via silver deposition following dispersion evaporation. A key advantage of this method is that it does not require expensive equipment or high energy consumption and also does not generate large amounts of waste that would need special treatment. Moreover, the study explores the potential practical application of the composites for preventing electromagnetic interference in security technologies.

Keywords: electromagnetic interference shielding, graphite, silver deposition, functional materials, surface conductivity.

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INTRODUCTION

The rapid development of electronic devices in all sectors of the modern life cycle has led to a significant increase in electromagnetic interference (EMI) between electronic devices. This problem poses significant threats to the performance, reliability, and safety of sensitive electronic systems, potentially causing operational disruptions, data corruption, and even unintentional signal interception (Yan & Cao, 2021; Zheng et al., 2022). In critical areas such as security technologies, the negative effects of EMI can have serious consequences, requiring robust and effective EMI SE solutions (Greety & Wesley, 2024). In the field of security technologies, and especially for police services, the reliable operation of electronic equipment is undeniable. Electromagnetic compatibility plays a key role in protecting critical operational capabilities:



- Ensuring communication integrity: Police operations rely heavily on secure and uninterrupted communication systems (e.g., radios, tactical communications devices). EMI SE materials usually focus on shielding sensitive transceivers and antennas from external noise, preventing communication disruptions and ensuring clear, reliable command and control during critical incidents (Hamamah et al., 2019).
- Protecting surveillance and sensor systems: Electronic tools such as body-worn cameras, vehicle-mounted surveillance systems, radar guns, and biometric scanners are fundamental to modern policing. Electromagnetic interference shielding materials (SE) shield these devices from interference, ensuring accurate data recording and reliable operation, which is vital for evidence collection and tactical decision-making (Wiśnios et al., 2025).
- Maintaining the reliability of vehicle electronics: Modern police vehicles are sophisticated platforms equipped with a multitude of electronic systems, from engine management to vehicle computing and navigation. Shielding ensures that these critical systems operate flawlessly, preventing electromagnetic “noise” from the vehicle or external sources from causing malfunctions that could compromise officer safety or mission success (Hu et al., 2019).
- Data and Information Security: In an era of increasing digital dependency, protecting sensitive data stored and transmitted by police equipment is of paramount importance. EMI shielding contributes to information security by reducing the risk of electronic eavesdropping or data corruption caused by electromagnetic radiation, thereby maintaining the integrity of intelligence and evidence (Yu-ichi Hayashi, 2016).

Traditional approaches to electromagnetic shielding, which often involve metal enclosures, often present limitations in terms of weight, corrosion susceptibility, and adaptability to complex system designs (Hong et al., 2024). This has prompted intensive research into advanced materials capable of offering lightweight, flexible, and highly efficient electromagnetic shielding. The attenuation of electromagnetic waves can be achieved through the development of advanced materials that integrate both absorptive and reflective mechanisms across multiple layers (Gahlout & Choudhary, 2019). The shielding performance of such materials is conventionally expressed as the cumulative contribution of absorption, reflection, and a correction factor that accounts for multiple internal reflections within the shielding medium (Serhan et al., 2019). For a material to be regarded as highly effective in electromagnetic wave mitigation, it must possess appropriate dielectric properties, sufficient magnetic permeability, adequate thickness, and stable performance across the relevant frequency ranges (Fu et al., 2022; Hwan et al., 2019). On the basis of these criteria, shielding materials are generally classified into several groups, including metallic systems (Stupar et al., 2023), carbon-based allotropes and derivatives (Cheng et al., 2023; Stupar et al., 2022), electrically conductive polymers (Uma Varun et al., 2019), and ferromagnetic compounds (Iqbal et al., 2019). Furthermore, hybrid materials can be synthesized through the combination of multiple constituents in order to integrate complementary properties required for efficient EMI SE (Bhardwaj & Nirmala, 2020; Uma Varun et al., 2019). Depending on their composition and intended application, these materials may be fabricated as metallic frameworks, polymer matrix composites, or functional coatings for textile substrates (Stupar et al., 2022; Y. Z. Zhang et al., 2020). A variety of surface modification techniques have been reported in the literature, including in-situ polymerization (Greety & Wessley, 2024), sputtering (Wang et al., 2020), layer-by-layer assembly (Wang et al., 2020), ionotropic gelation and conjugation (Vučković et al., 2021), and spin-coating (J. Zhang et al., 2022).

Among the most promising candidates are polymer matrix composites, especially those based on epoxy resins reinforced with conductive fillers such as electric conductive materials like graphite (Stupar et al., 2025). Carbon-based materials are widely utilized as reinforcement agents in aerospace, automotive, and defence applications owing to their mechanical robustness, durability, and ease of processing (Behera et al., 2024; J. Zhang et al., 2022). Their outstanding mechanical performance, coupled



with high electrical and thermal conductivity, enhances composite functionality and contributes to improved EMI SE (J. Zhang et al., 2022). This study provides a comprehensive perspective on epoxy/graphite composites for EMI protection. Also, examine various fabrication techniques for integrating graphite into epoxy matrices, discuss the underlying mechanisms of EMI shielding, and evaluate their performance characteristics. In addition, this study addresses the specific applications and benefits of these advanced composites within security technologies, highlighting their essential role in improving the operational resilience and security posture of police services against electromagnetic threats. These epoxy/graphite composites offer a unique combination of mechanical strength, processability, and tunable electromagnetic properties, making them ideal for next-generation shielding applications. Although conventional techniques for depositing metal nanoparticles onto conductive and non-conductive particle surfaces are effective, they often demand elevated temperatures and rely on hazardous and costly reagents. In contrast, dispersion evaporation (Liu & Xu, 2020) has emerged as a promising alternative for surface modification and nanocomposite fabrication. This technique of particles' modification employs inexpensive, non-toxic reagents and operates without the necessity for high-temperature conditions or significant electrical input.

Therefore, the objective of this study is to develop and evaluate silver-modified graphite/epoxy composites prepared via dispersion evaporation, with the aim of enhancing EMI SE of graphite particles while maintaining cost efficiency, material processability, and characterization. This study represents the first systematic study of general usage of graphite (unmodified and modified) particles for EMI SE, along with our previous study (Stupar et al., 2025).

EXPERIMENTAL PART

Silver conductive dispersion synthesis – reagents and materials

The synthesis of the silver conductive solution was performed by the modified Tollens process, which was described in detail by Stupar et al. (Stupar et al., 2023). First, 15 g of silver acetate (CH_3COOAg , 99.0 %, Sigma-Aldrich (USA)) was dissolved in 37.5 ml of ammonium hydroxide solution (NH_4OH , 30%, Zorka Pharma-Hemija (Serbia)) at room temperature. After 20 minutes, 1 ml of formic acid (HCOOH , 98.0%, Sigma-Aldrich (USA)) was added to the solution. The mixture was then stirred for 24 hours and filtered using a 0.45 nm nylon syringe filter (Sartorius, Germany).

The Graphite Particles' Surface Modification by Dispersion Evaporation and Composite Preparation

Graphite powder (100 g, Acros Organics, USA) was functionalized by immersion in silver conductive dispersion at three distinct volumes: 50, 100, and 150 ml. This variation yielded samples with different graphite-to-electrically conductive dispersion ratios, subsequently designated as 0.5, 1.0, and 1.5 Graphite@Ag particles, respectively, reflecting the ratio of solid to liquid phases. Each mixture was subjected to thorough mixing in a dark environment at ambient temperature for a period of 24 hours. Initial drying was conducted by air exposure at room temperature to facilitate the evaporation of ammonia from the dispersion. This process was evidenced by a notable color transition from black to silver and the liberation of a distinct formic acid odor. Following ambient evaporation, the powder samples underwent thermal treatment at 80° C for 60 minutes within a thermostatic chamber (G209A, SDL Atlas, UK), accompanied by intermittent stirring with a glass rod. This heating step is critical for the complete volatilization of formic acid from the silver conductive dispersion and the



robust formation of an elemental silver film on the graphite particle surfaces. After heat treatment, the samples were washed using methyl alcohol (CH_3OH , 99.8%, Merck Group (Germany)) and dried at room temperature.

The synthesized silver-coated graphite powders, along with a commercial graphite powder for comparative analysis, were homogeneously dispersed in an epoxy resin matrix (Type W300, R&G Faserverbundwerkstoffe GmbH, Germany). The filler loading was systematically varied across a range of 10 to 40 weight percent (wt.%). The prepared composite mixtures were then cast into appropriate molds to facilitate subsequent physical, mechanical, and EMI SE characterizations. Following mixing, the composites were cured by drying in a vacuum chamber (VD 23, Binder, Germany) at 80° C for 24 hours.

Characterization and Measurement

The microstructure and morphology of unmodified and modified particles and semi-quantitative elemental analyses were studied by field-emission scanning electron microscopy with Energy-Dispersive X-ray Spectroscopy (JEOL JSM 7001F, Japan). The Graphite@Ag powder samples were evaluated by a Vanta Max series portable handheld X-ray fluorescence (XRF) spectrometer (Olympus, Germany). The XRF spectrometer had a rhodium source, an SSD detector, 4 W maximum power output, 50 kV, and eight filters. Measurement conditions were 40 kV, 1 mA for 30 s under air. Particle size distributions of the Graphite@Ag suspensions were determined by laser diffraction in wet mode using an Anton Paar PSA 1190. Deionized water served as the dispersant, and Igepal CA-630 was added to enhance particle wetting. The slurry was homogenized by stirring for 5 min. with ultrasonication at 50 W. Data were evaluated with Mie theory assuming a refractive index of 2.0 and an absorption (imaginary) index of 1.0. Steady-shear viscosity was measured on an Anton Paar MCR 302 rheometer equipped with a concentric-cylinder CC27 geometry, in accordance with ISO 3219, at $25.0 \pm 0.1^\circ\text{C}$. The shear rate was stepped logarithmically from 0.1 to 1000 s^{-1} (10 equidistant logarithmic points per decade), while the dwell time per point decreased from 30 s to 1 s on a logarithmic schedule. Torsional DMTA was performed on rectangular specimens using the same rheometer fitted with a CTD-620 temperature chamber and SRF12 fixtures. Samples had approximate dimensions of 3 mm $\times$ 10 mm $\times$ 54 mm. Temperature sweeps from 0 to 80 °C were conducted at $2^\circ\text{C}\cdot\text{min}^{-1}$ with a constant frequency of 1 Hz and a constant logarithmic strain amplitude of 0.1% (within each material's linear viscoelastic range).

The dielectric parameters of a material are measured by the waveguide method, where the cross section of a rectangular waveguide determines the frequency range to be evaluated. In this experiment, according to the X-band waveguide dimensions, the material was processed into a size of 22.8 mm $\times$ 10.15 mm $\times$ 2.0 mm. The samples were sanded and polished, then cleaned and dried, and the dielectric parameters were tested using a vector network analyzer (Agilent, model number PNA-N5244A). The electrical resistivity of particles was determined by 4-wire measurements using RM3000+ (Jandel, UK). Samples for testing electrical conductivity were made by pressing pellets with a thickness of 1 mm. The applied pressure per pressing tool is 200 bar, and the hydraulic press type HZVT 2.5 (Dunkes, Germany) was used.

RESULTS AND DISCUSSION

SEM/EDS Analysis

Structural, morphological, and semi-quantitative characterizations of Graphite@Ag particles and their composites were conducted using scanning electron microscopy (SEM) coupled with ener-



gy-dispersive X-ray spectroscopy (EDS). SEM photographs shows Graphite@Ag particles prepared with varying amounts of silver conductive dispersion, as well as the corresponding Graphite@Ag/epoxy composites, are displayed in Figure 1. Figure 2 presents both the SEM images and EDS spectra for Graphite@Ag(1.0) particles and the epoxy resin containing 30 wt.% Graphite@Ag(1.0) particles.

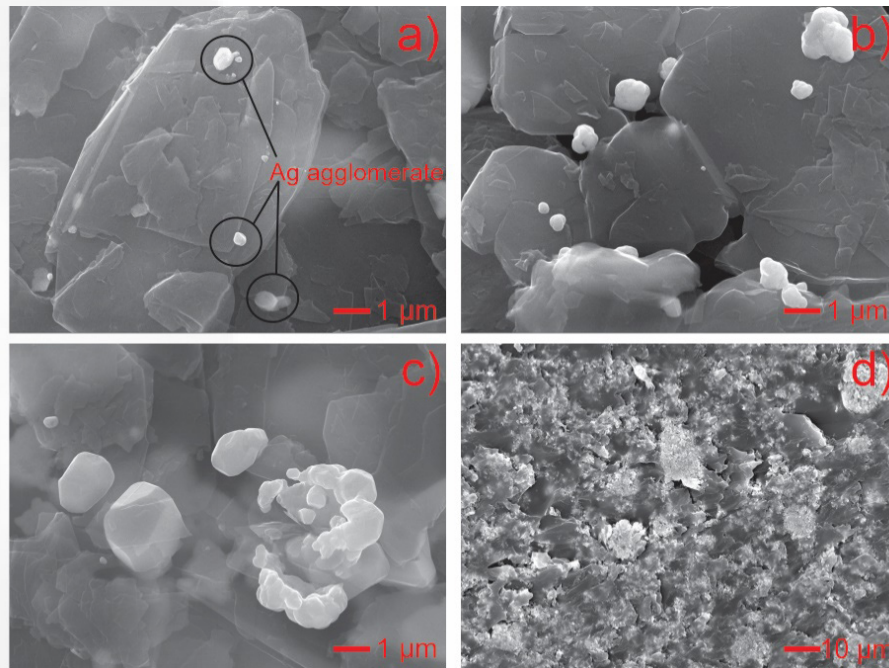


Figure 1: The SEM micrographs of 0.5 a), 1.0 b), and 1.5 c) Graphite@Ag particles and 30 wt.% Graphite@Ag particles (1.0)/epoxy composite d).

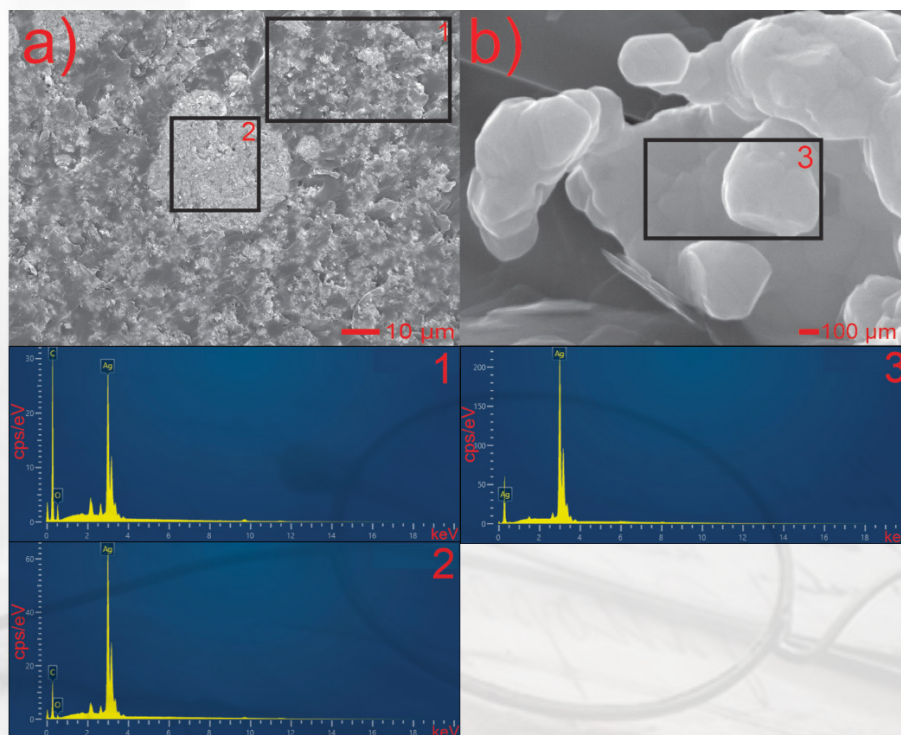


Figure 2: The SEM micrograph and EDS spectra of 30%Graphite@Ag(1.0)/epoxy a) and silver particles agglomerate deposited onto graphite particle b).

Micrographs presented in Figure 1 indicate that the appearance of silver agglomerates is significantly influenced by the amount of electroconductive dispersion used. In the case of the Graphite@Ag particles with 0.5 dispersion, agglomerates are minimal, whereas with the Graphite@Ag particles using 1.5 dispersion, a higher concentration of silver nanoparticle agglomerates is observed on the surface of the graphite particles. This finding aligns with the research conducted by Stupar et al. (Stupar et al., 2022), where scanning electron microscopy was utilized to examine carbon fabrics modified with silver particles. Their study confirmed that the number of agglomerates on the fabric's surface increases with repeated soaking in a silver complex dispersion.

Figure 2 highlights the excellent coverage of the epoxy matrix with Graphite@Ag particles. Additionally, the energy-dispersive spectroscopy (EDS) analysis of composite area 1 reveals the presence of carbon, silver, and oxygen, comprising 54.34%, 34.62%, and 11.05% by weight, respectively. In the second EDS spectrum (area 2), the corresponding values are 23.32%, 4.25%, and 72.43% by weight. Figure 2b illustrates a pure agglomerate of silver particles.

XRF Analysis

According to the XRF analysis, the amount of silver in Graphite@Ag (0.5), (1.0), and (1.5) particles and the Graphite@Ag (1.0)/epoxy resin composite was 9.93, 20.59, 26.51, and 33.85 wt.%, respectively. The XRF analysis confirms the dependence of silver deposition on the amount of the silver conductive dispersion. The XRF spectra of pure graphite (a), Graphite@Ag(0.5) (b), Graphite@Ag(1.0) (c), Graphite@Ag(1.5) (d), and 30%Graphite@Ag(1.0)/epoxy composite are shown in Figure 3. Peak characteristics of elemental silver are marked on all XRF spectra shown in Figure 3.

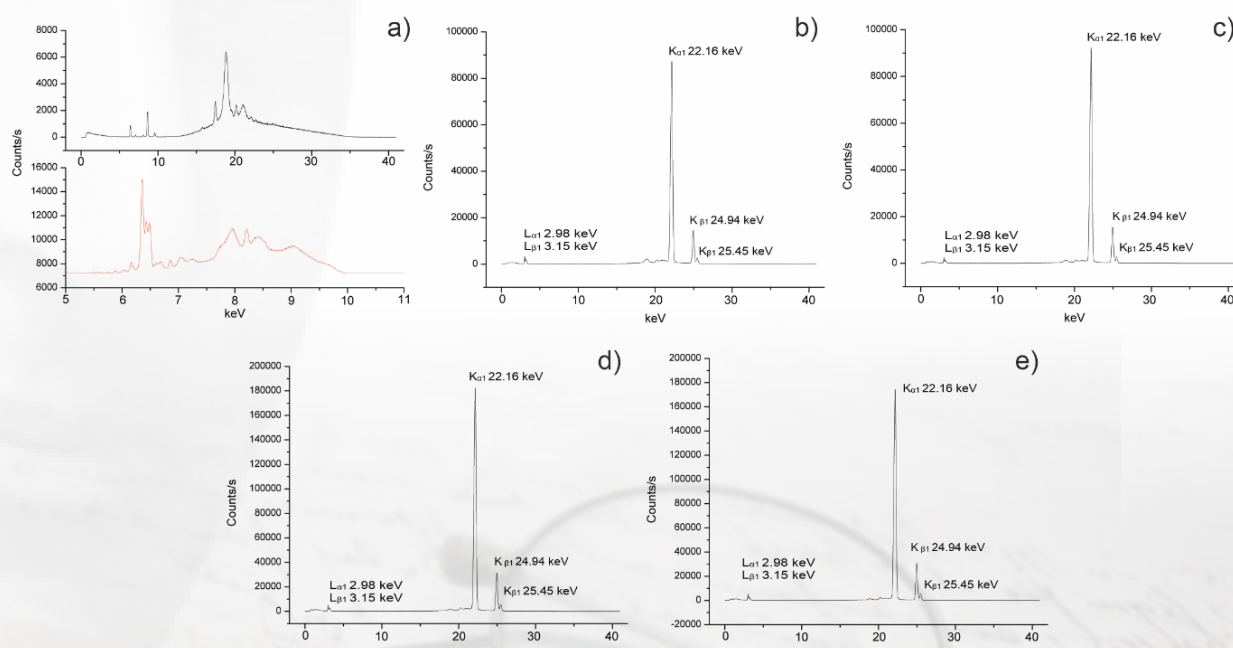


Figure 3: The XRF spectra of pure graphite (a), Graphite@Ag(0.5) (b), Graphite@Ag(1.0) (c), Graphite@Ag(1.5) (d), and 30%Graphite@Ag(1.0)/epoxy composite (e).

Rheological Properties

The systematic quantification of the relationship between composition and rheology provides a rigorous foundation for defining processing windows and application conditions. Steady-shear measurements were used to determine the apparent viscosity as a function of shear rate, $\eta(\dot{\gamma})$ (Figure 4a), and the corresponding flow curves, $\tau(\dot{\gamma})$ (Figure 4b), for uncured epoxy suspensions containing varying mass fractions of Graphite@Ag(1.0). In addition, oscillatory tests provided application-relevant rates of different wt.% of Graphite@Ag(1.0) particles in the suspension viscoelastic parameters: the storage modulus G' (Figure 5a) and the loss modulus G'' (Figure 5b). For completeness, the composition-dependence of G' is summarized in Figure 6a, while the particle-size distribution is presented in Figure 6b.

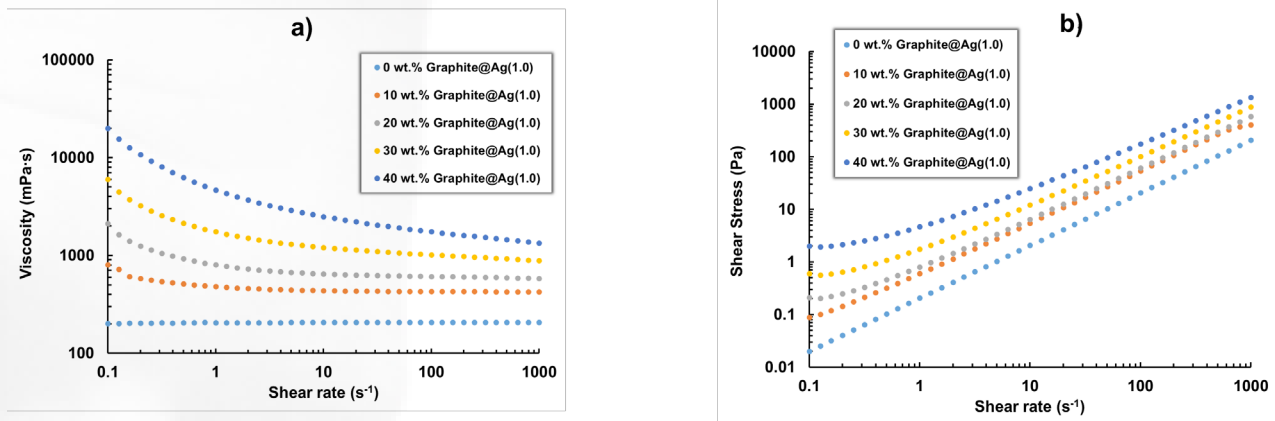


Figure 4: The dependence of viscosity and shear stress on shear rate.

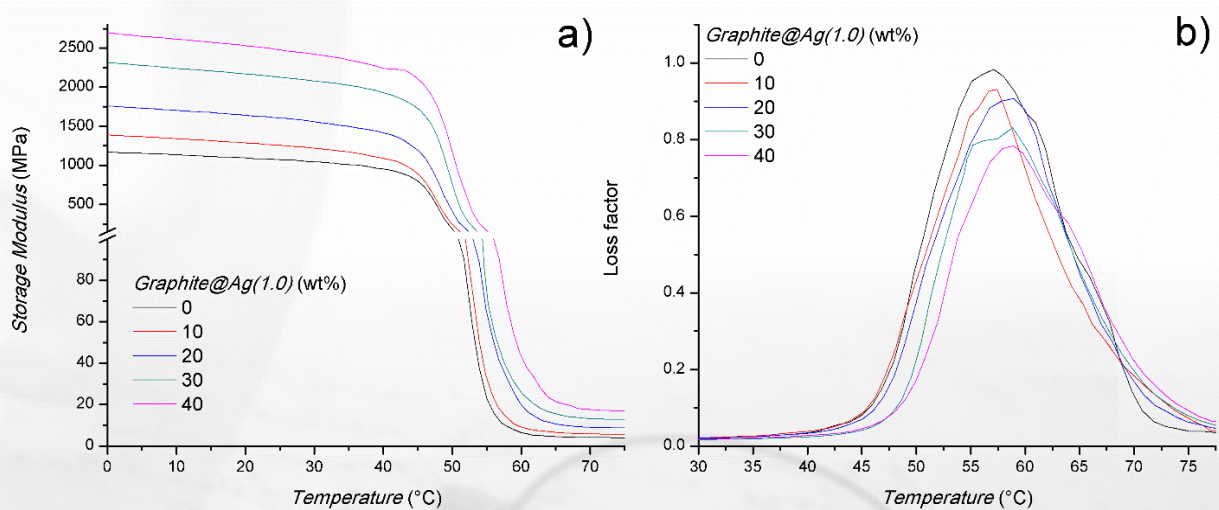


Figure 5: The dependence of storage modulus (a) and loss factor (b) on temperature for different mass fractions of Graphite@Ag(1.0) particles in the suspension.

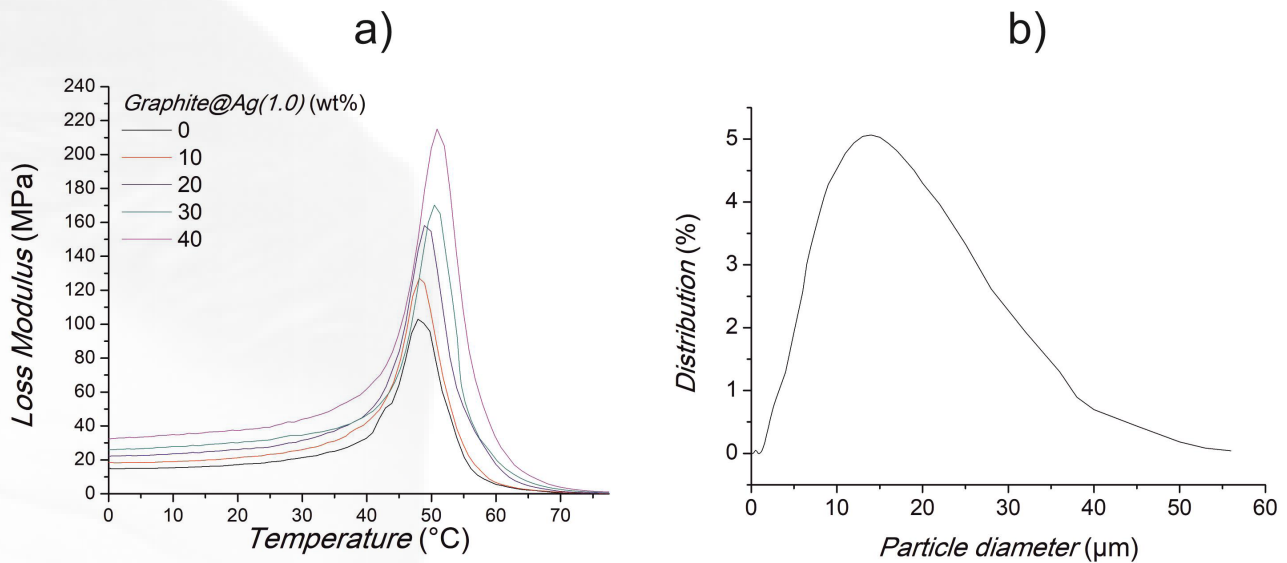


Figure 6: The loss modulus of epoxy composites with different mass fractions of Graphite@Ag(1.0) particles (a), and size distribution of Graphite@Ag(1.0) particles (b)

According to Figure 4, it can be concluded that, with an increase in the concentration of modified graphite particles, the viscosity of the suspension also increases. At 25°C the epoxy resin without Graphite@Ag(1.0) behaves essentially Newtonian, with viscosity nearly constant (207 mPa·s) over 0.1–1000 s⁻¹ (Figure 4. a). Incorporating Graphite@Ag(1.0) particles increases the low-shear viscosity by orders of magnitude and induces pronounced shear-thinning. At 0.1 s⁻¹ viscosity rises from 207 mPa·s for the pure epoxy resin to 20058 mPa·s for the 40 wt.% of Graphite@Ag(1.0), while at 1000 s⁻¹ it is 201 mPa·s (0 wt.%) and 1341 mPa·s (40 wt.%). From Table 1 it can be concluded that the shear-thinning factor ($\eta_{0.1}/\eta_{1000}$) increases progressively with increasing graphite content. This indicates an increasingly pronounced dependence of viscosity on shear rate. A higher particle loading offers greater resistance to flow at low shear rates, but as the shear rate increases, the viscosity decreases substantially. The corresponding flow curves (Figure 4. b) are well described by the Ostwald–de Waele law, with the flow index n decreasing systematically with filler content (Table 1.). These trends reflect sub-linear growth of stress with shear rate as the suspension becomes increasingly non-Newtonian. Therefore, no clear yield stress is evident within the 0.1–1000 s⁻¹ shear rate.

Table 1: Influence of graphite@Ag content on low- and high-shear viscosity and the flow index n (25 °C)

Graphite@Ag [wt.%]	η (0.1 s ⁻¹) [mPa·s]	η (1000 s ⁻¹) [mPa·s]	$\eta(0.1)/\eta(1000)$	n
0	207.2	201.3	1.0	1.00
10	890.0	423.3	2.1	0.96
20	2121.3	579.8	3.7	0.91
30	6008.3	883.9	6.8	0.84
40	20058.0	1340.8	15.0	0.75

A higher particle mass fraction, together with the platelet-like graphite morphology, promotes the formation of additional particle-particle and particle-polymer interactions (van der Waals and electrostatic), thereby increasing the resistance to flow at low shear rates (Naz et al., 2016). Moreover, higher particle loadings increase interfacial contact area, owing to the graphite's non-spherical (platelet) morphology. With increasing shear, this weakly bonded network is progressively disrupted, and the platelets tend to align with the flow, leading to the observed pseudoplasticity (shear-thinning) and to the convergence of apparent viscosity values at high shear rates. In practice, formulations with ≥ 30 wt.% demand higher shear rates (or modest heating) for mixing and vacuum degassing.

Viscosity plays a critical role in the manufacturing of large-surface or complex-shaped epoxy-based composite components for security applications. Excessively high viscosity hinders resin flow, complicating uniform distribution and thorough impregnation of reinforcements. Consequently, precise rheological control and optimization are crucial to ensure high-quality, reliable components.

Empirically, liquid, uncrosslinked epoxy composite systems with a zero-shear viscosity (η_0) below $4.5 \cdot 10^5$ Pa·s are generally considered pourable and thus suitable for fabrication. Moreover, even modest increases in shear rate during mixing lead to a sharp reduction in apparent viscosity. This behavior facilitates homogenization of the material and supports defect-free consolidation in complex geometries.

DMTA provides a robust framework for probing the viscoelastic response of polymer/composite systems. In this context, the storage modulus G' quantifies the elastic energy stored and recovered during deformation, whereas the loss modulus G'' reflects the viscous dissipation. Temperature-sweep experiments (Figure 5) show that all specimens follow the same qualitative trend in G' , G'' , and $\tan \delta$: G' attains its highest values in the glassy state and decreases as temperature rises, while G'' increases over the low-temperature interval (0–33°C) as segmental mobility grows, culminating in a $\tan \delta$ maximum that marks the glass-transition region. The ranking of stiffness is governed by graphite content. The 40 wt.% composite exhibits the largest G' , followed by 30, 20, and 10 wt.% formulations, with the neat epoxy lowest. In the 0–44°C interval, the G' decreases for all specimens, with a more pronounced drop at higher graphite contents; the characteristic slopes are 13.1, 12.4, 11.2, 9.1, and 7.0 MPa/°C for 40, 30, 20, 10 wt.% and the neat resin, respectively.

The glass transition (T_g) shifts to higher temperature with increasing graphite loading: for the neat matrix the transition is essentially traversed above 61°C, whereas for the 40 wt.% composite it occurs above 66°C. This shift reflects restricted cooperative motions of the polymer segments caused by graphite platelets and their interfacial interactions with the matrix (including hydrogen bonding), which stabilize the structure and delay relaxation to higher temperatures (De La Fuente et al., 2003). Consequently, substantial compliance (rubbery response) is achieved only at elevated temperatures. Notably, the stiffness ranking observed in the glassy state persists into the rubbery region as well (Figure 6).

DMTA temperature sweeps show a slight, monotonic upshift of the T_g with increasing Graphite@Ag(1.0) content: 57.1, 57.5, 58.1, 59.0, and 59.9°C for 0, 10, 20, 30, and 40 wt.%, respectively. This indicates modest restriction of cooperative segmental motions by the platelet filler and interfacial constraints. Consistently, the damping peak ($\tan \delta$ max) decreases with loading: 0.98, 0.93, 0.89, 0.82, and 0.76 for 0–40 wt.%. This reflects reduced viscous dissipation and a larger elastic contribution (lower G''/G'). Outside the transition region, the moduli trends confirm rheological stability with low energy loss across the examined range, supporting the suitability of all formulations for service under ambient conditions. A brief comparison of the results of this study and some previous studies is shown in Table 2.



Table 2: Comparison of DMTA results for epoxy-based composites with graphite or carbon reinforcement

Study	Epoxy resin system	Reinforcement / Filler	T _g range (°C)	Max modulus (MPa)	Notes
This study	Epoxy casting resin (type W300) + amine hardener	Modified graphite particles (0–40 wt.%)	57.1–59.9 (from peak tanδ)	G' = 2692.4 MPa at 0 °C (40 wt.%)	Graphite improves stiffness and T _g ; viscosity limits casting above 30 wt.%
(SudarshanRao, 2021)	LAPOX-12 epoxy + polyamine K5 hardener	Carbon fabric + graphite (0–6 wt.%)	118.1–133.0 (from E'' and tanδ peaks)	E' = 28.18 GPa at RT (6 wt.%)	Significant increase in modulus and damping with graphite loading
(Stark et al., 2015)	Hexcel 6376C epoxy prepreg	Unidirectional carbon fibers	139.4–223.8 (E'' peak, extrapolated to 0.01 Hz)	Not reported	T _g strongly dependent on curing degree; DMA used to monitor curing progress

The DMTA results obtained in this study were compared with those reported in previous literature. As shown in Table 1, although the absolute values of T_g and storage modulus vary depending on the epoxy system and filler type, a consistent trend is observed—graphite or carbon reinforcement increases both stiffness and T_g. In particular, the present work demonstrates that graphite contents above 30 wt.% lead to significant increases in viscosity, which may limit their application in casting processes without using vacuum and vibrations. This aspect is not covered in the compared studies and highlights the importance of rheological characterization alongside mechanical performance evaluation.

The Electrical Resistivity and EMI Shielding Effectiveness

One of the most important physical properties that influence the behavior of materials in the EMI SE process is electrical resistance. This parameter can significantly help in the selection of materials for making composites intended to achieve electromagnetic compatibility. Measurements of electrical resistance of particles of commercial graphite and graphite modified with silver deposits in the presented study show the following results: for the particles of untreated graphite, Graphite@Ag(0.5), Graphite@Ag(1.0), and Graphite@Ag(1.5) the following values of resistivity were 0.91 mΩ, 0.39 mΩ, 0.11 mΩ, and an impressive 0.07 mΩ, respectively. These resistance test results clearly show that as the mass of silver deposition decreases, the electrical resistivity of particles that contribute to EMI SE and signal beam attenuation increases. This substantial enhancement emphasizes the effectiveness of silver modification in boosting conductivity, representing a significant advancement in material performance, which confirms the enhanced EMI SE characteristics, especially wave reflection.

The study focused on the potential application of composite materials for EMI SE within the X-band frequency range (8.2–12.4 GHz). Figure 7 displays the overall EMI SE of samples with different sil-



ver-to-graphite ratios (Figure 7a) and varying mass fractions of Graphite@Ag(1.0) embedded in an epoxy matrix (Figure 7b).

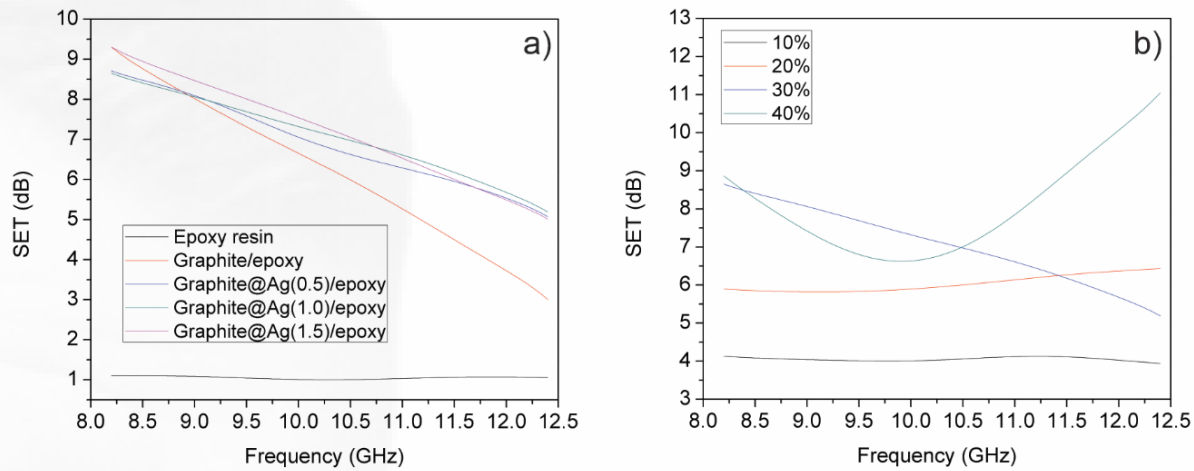


Figure 7: Measured EMI effectiveness shielding of samples with varying silver-to-graphite ratios (a), and different mass fractions of Graphite@Ag(1.0) within the epoxy matrix (b) in X-band frequency range.

The data on the EMI shielding coefficients reveal that increasing the silver content on the graphite surface correlates with higher shielding performance. Analysis of the results in Figure 7a and the accompanying supplementary material shows the total EMI SE for various epoxy resin composites: 30% Graphite/epoxy, 30% Graphite@Ag(0.5)/epoxy, 30% Graphite@Ag(1.0)/epoxy, and 30% Graphite@Ag(1.5)/epoxy, which yield average SE values of 6.02, 6.91, 7.06, and 7.21 dB, respectively. This trend indicates that increasing silver loading on the graphite surface can boost shielding efficiency by approximately 21%. Similar findings were reported by Stupar et al. (Stupar et al., 2022), where depositing silver onto carbon fabric enhanced both electrical conductivity and EMI shielding capabilities. Further analysis of the reflection and absorption characteristics within the X-band shows that reflection increases from 4.49 dB for pure graphite to 6.01 dB for Graphite@Ag(1.5)/epoxy, while absorption decreases from 1.72 dB to 1.18 dB. This behavior is likely due to the high electrical conductivity of silver, which promotes electromagnetic wave scattering within the composite, thereby contributing to SE. Examining the influence of particle content, the data on samples with 30% Graphite@Ag(1.0) indicate that increasing the particle mass fraction from 10% to 40% enhances shielding performance, with wave attenuation values of 3.68, 6.04, 7.06, and 8.01 dB, respectively. This is due to the higher particle concentrations leading to more frequent interactions and scattering of electromagnetic waves, weakening the wave strength. Similar observations were made by Wei et al. (Wei et al., 2021), pointing out that as the concentration of active expanded graphite particles in the polymer matrix increased, the same effect was noted. Notably, the sample containing 40% graphite@Ag(1.0) in epoxy resin exhibited a distinct EMI SE trend, which is attributed to the formation of larger agglomerates during manufacturing. These agglomerates disturb the uniform particle distribution, resulting in a more porous structure that enhances multiple scattering of electromagnetic waves and thus improves the overall shielding performance. By comparing the results from the literature and the results of the test of the effectiveness of weakening the strength of the wave beam, the lower efficiency of the tested can be explained by the thickness of the composite material. By increasing the material or forming a honeycomb contour of the material, it is possible to increase the efficiency of the material. Therefore, by modifying this composite, it is possible to improve its EMI SE. Also, by further crushing the particles, it is possible to improve the packing of the particles

in the composite, which would reduce the possibility of beam leakage in the space between the particles. Table 2 summarizes these findings alongside relevant data from other studies. Table 3 shows the results presented in this paper and those of other studies.

Table 3: *Electrical conductivity and average EMI SE for different composites.*

Composite	Filler content	Sample thickness, (mm)	SET, (dB)	Frequency, (GHz)	Ref.
Carbon black/EPDM	50%	5.5	~8	8.2-12.4	(Ghosh & Chakrabarti, 2000)
Aramid nanofiber assisted preparation of 3D-oriented graphite/silicone composite slices	32.68%	2	20.15	8.2-12.4	(Lei et al., 2023)
Graphite nanoparticles/PE	10 %	1	~22	26-37.5	(Vovchenko et al., 2018)
Carbon nanotubes/PE	4.5	1	42	26-37.5	(SudarshanRao, 2021)
graphite/PVDF	10%	/	2.25	8.2-12.4	(Kumaran et al., 2015)
1 wt. % of AgNP-10 wt. % graphite/PVDF	/	/	4.9	8.2-12.4	(SudarshanRao, 2021)
e Ag-EG (10 wt.%) @pPDMS	/	2	12	8.2-12.4	(Lin et al., 2025)
Graphite/epoxy	7	2	19-21	8.2-12.4	(Gümüş et al., 2023)
Carbon black/epoxy	7	2	9	8.2-12.4	(Gümüş et al., 2023)
Graphite@Ag(1.5)/epoxy	30 %	1	7.21	8.2-12.4	this study
Graphite@Ag(1.0)/epoxy	40 %	1	8.01	8.2-12.4	this study

CONCLUSION

This study focuses on the modification of graphite particles using varying amounts of synthesized silver conductive dispersion and their application in the production of composite materials with an epoxy matrix. Additionally, it explores potential applications in EMI SE and material strengthening. The results obtained from the study are as follows:

- The scanning electron microscopy analysis indicates that the appearance of silver agglomerates is significantly influenced by the amount of electroconductive dispersion used. The increase of dispersion amount increases the agglomeration of silver particles.
- The analysis of the elemental composition of the particles confirms that, as the volume of the electroconductive complex used during the modification process increases, the amount of elemental silver deposited on the surface of the graphite particles also increases.
- The rheological characterization shows that increasing the concentration of modified graphite (Graphite@Ag(1.0)) raises the suspension viscosity while remaining within a practical processing window. The storage modulus G' attains its highest values in the glassy regime and decreases with further temperature increase. In addition, higher Graphite@Ag(1.0) loadings shift the glass



transition to higher temperatures; at 40 wt%, the T_g rises by nearly 3°C, indicating only a modest effect on the breadth of the glass-transition region. Since all T_g values exceed 50°C – and silver further elevates T_g – the formulations operate below T_g within the intended service window (<50°C), which is beneficial for dimensional stability, homogenized stress transfer, and retention of modulus in use. The deposition of silver particles onto the graphite surface significantly increases the electrical conductivity, which highly contributes to EMI SE increasing.

- The measured values of coefficients and the effectiveness of EMI SE in composites show that, as the mass fraction of silver on the graphite surface increases, the EMI SE also rises. Total EMI SE for various epoxy resin samples: 30%Graphite/epoxy, 30%Graphite@Ag(0.5)/epoxy, 30% Graphite@Ag(1.0)/epoxy, 30% Graphite@Ag(1.5)/epoxy yield average values of 6.02, 6.91, 7.06, and 7.21 dB, respectively, in the X-band. Also, the increase of the overall number of particles subsequently increases EMI SE properties.
- In summary, this cost-effective modification method enhances the properties of graphite, which are essential for applications in composite production and EMI shielding materials. Additionally, incorporating modified graphite particles improves the overall properties of the composite. Therefore, graphite particles modified with elemental silver can fulfill the stringent requirements for producing composites that are subjected to mechanical stress while also minimizing EMI.

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RAMAN SPECTROSCOPY IN FORENSIC SCIENCE: DEVELOPMENTS AND FUTURE DIRECTIONS IN CANNABINOID ANALYSIS

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ABSTRACT

Purpose: The purpose of this paper is to review how Raman spectroscopy - particularly portable Raman and SERS - supports cannabis-related forensic work across plant material characterisation and human biofluid detection, and to highlight methodological trends (chemometrics, computational modelling, AI, and advanced sampling) that are pushing the field toward reliable, field-deployable and legally robust workflows.

Design/Methods/Approach: Using narrative approach, critical synthesis of recent literature spanning: (i) plant-focused Raman/CARS microscopy and handheld classification for varietal and chemotype discrimination, stress diagnostics, and quantification; (ii) human-sample SERS using portable devices for minimally invasive detection in saliva, urine, plasma, and blood; and (iii) cross-cutting innovations - chemometrics (PCA/PLS/OPLS-DA), DFT-aided spectral assignment, AI/ML pipelines, and alternative excitation/sampling geometries (e.g., NIR, SORS).

Findings: Raman methods accurately differentiate hemp vs. drug-type cannabis, classify varieties/chemotypes in vivo, and detect early abiotic stress, while SERS enables sensitive detection of cannabinoids in complex biofluids with minimal preparation - preserving material for downstream DNA analysis. Emerging AI-assisted models and optimised excitation regimes improve classification, quantification, and interpretability, and handheld instruments demonstrate strong potential for on-site decision-making in forensic and regulatory settings.

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Originality/Value: This review integrates plant and human-matrix applications with the latest computational and instrumentation advances, framing Raman spectroscopy as a rapid, reagent-free, portable, and courtroom-defensible platform for cannabis forensics - bridging laboratory capability with operational field use.

Keywords: Raman spectroscopy; cannabis; cannabinoids; SERS; forensic toxicology; chemometrics; portable instrumentation.

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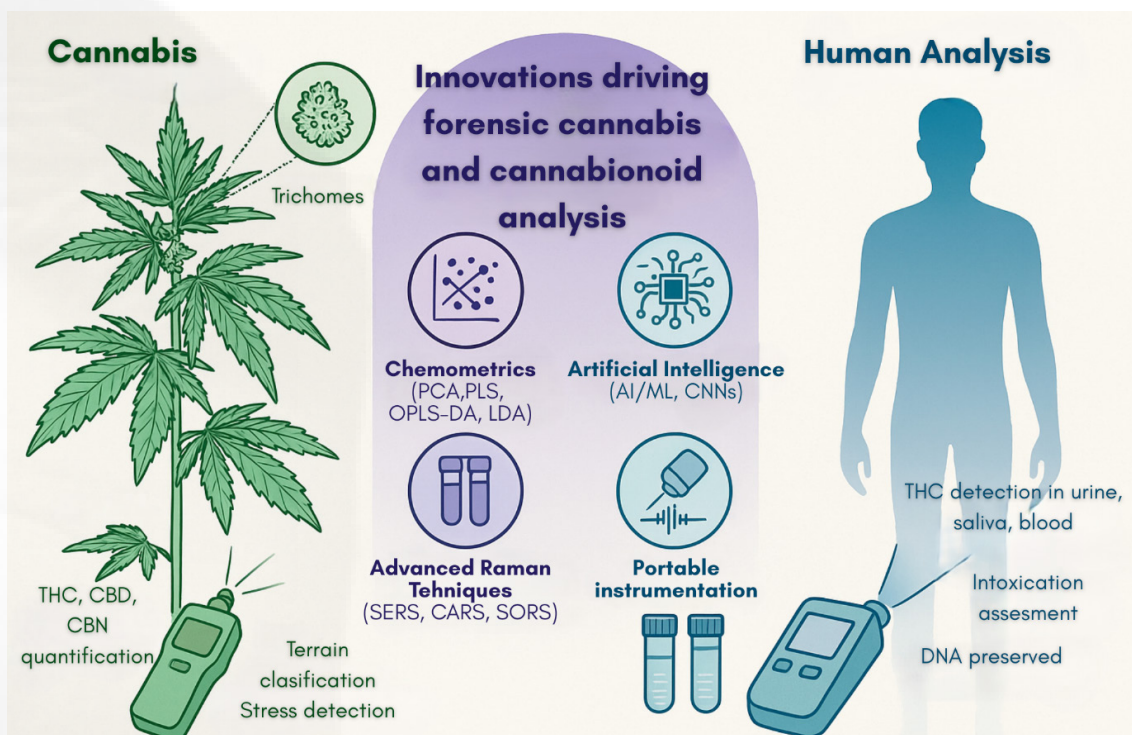
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INTRODUCTION

Raman spectroscopy is an analytical method founded on the principle of inelastic light scattering, which arises when electromagnetic radiation interacts with molecular matter. As this interaction takes place, the vibrational energy levels of the molecules change. This results in the emission of photons whose wavelengths differ from those of the incident beam. This discrepancy, known as the Raman shift, underlies the identification of chemical structures (Penido et al., 2016).

This method is recognised as a valuable analytical tool in forensic science because of its non-destructive nature and its ability to identify (Doty et al., 2016). It has been shown to be highly effective in examining various types of forensic evidence, including fibres, bodily fluids, bones, hair and gunshot residue (Doty et al., 2016). The use of advanced data analysis techniques, particularly chemometrics improves the reliability and accuracy of Raman investigations, producing statistically sound results suitable for legal use (Doty et al., 2016). The operational simplicity and reagent-free nature of Raman spectroscopy make it highly suitable for preliminary screening in field laboratories and at crime scenes, where maintaining the chain of custody and minimising sample alteration are among the most important steps (Doty et al., 2016).

Traditional methods often require sample preparation, like staining for microscopy, which improves visibility but ruins the sample integrity (Hegde, 2024). They also tend to be slow, rely heavily on human effort, and struggle with dried or mixed fluids, which are complex and variable by nature (Harbison & Fleming, 2016). Overall, while these conventional approaches have been widely used, they are limited in sensitivity, specificity, and speed, showing the need for newer, more selective, and less destructive techniques (Virkler & Lednev, 2009; Hegde, 2024).

The identification of body fluids in the crime scene, for example, usually begins with simple screening tests - presumptive tests, and is followed by more precise confirmatory tests. Presumptive tests are helpful for quickly checking if evidence might be of relevance to the case, but they also often give



false-positive results and cannot be fully trusted just by themselves (Harbison & Fleming, 2016). If a presumptive test is negative, the sample is usually discarded, but if it is positive, confirmatory tests are done. A major problem is that chemical tests are destructive - they can damage or even destroy the evidence, sometimes through chemical reactions, colour changes, or exposure to strong light (Virkler & Lednev, 2009; Zapata et al., 2015). This is a serious issue because it can prevent further examinations, such as DNA analysis (Harbison & Fleming, 2016).

Another issue to consider is that body fluids are characterised by the presence of many shared components. For instance, amylase is present in both saliva and semen, while urea is found in urine, sweat, and semen, albeit in different quantities. Due to these overlaps, there is a possibility that tests may confuse one fluid for another, thus resulting in false positives (Virkler & Lednev, 2009). It is important to note that certain chemicals commonly utilised in presumptive testing, such as benzidine, have the potential to induce adverse reactions when exposed to certain substances, including plant enzymes. This interaction can result in the production of erroneous test results (Zapata et al., 2015).

Raman spectroscopy plays an important role in the specialised field of forensics, particularly in the detection of forgeries and the authentication of cultural heritage objects and financial fraud (Deneckere et al., 2012). As a vibrational spectroscopic technique, Raman spectroscopy can identify pigments and other organic and inorganic materials. This provides critical insights into the composition and provenance of artworks and banknotes found at crime scenes. Its ability to deliver detailed chemical information means that the authenticity of these items can be assessed without compromising their physical condition. In forensic fibre analysis, for example, Raman spectroscopy complements techniques such as microspectrophotometry by providing detailed molecular information about dyes, thereby enhancing the overall discriminatory power of the analysis (Lepot et al., 2008).

Beyond standard forensic applications, Raman spectroscopy has also found applications in homeland security and hazardous material detection (Izake, 2010). The invention of portable Raman instruments enables the non-contact detection of chemical and biological materials, which is essential for reducing the exposure risk to first responders in high-stakes environments (Izake, 2010). This approach allows the police and special forces to identify dangerous substances, including explosives and illicit drug mixtures, without any direct physical interaction. Furthermore, advanced technologies such as Spatially Offset Raman Spectroscopy (SORS) allow for the non-invasive chemical characterisation of substances concealed within opaque containers or packaging, which are typically present in illegal laboratories (Izake, 2010).

Advancements in the domain of portable Raman spectroscopy have led to an expansion in the applicability of this technique in forensic investigations conducted in the field. Commercially available handheld systems, Thermo Scientific TruNarc® and Chemring PGR-1064®, have been tested and gave very good results in presumptively identifying narcotics in the field. These systems demonstrate high reproducibility and analytical accuracy, particularly when enhanced with surface-enhanced Raman spectroscopy (SERS) substrates (Spicher, 2016). These instruments incorporate extensive onboard spectral libraries, enabling rapid, non-destructive analysis without the need for laboratory infrastructure (Spectroscopy Online, 2020). Portable Raman devices are not only useful for drug detection, but also for examining bodily fluids, fibres, counterfeit pharmaceuticals and explosive residues, thereby supporting a wide range of forensic scenarios (AZoM, 2019). By following core forensic principles, such as Locard's exchange principle, this technology enables swift, real-time decision-making without compromising the integrity of evidence. Together, these developments highlight the increasing importance of portable Raman spectroscopy as a reliable and adaptable tool in modern forensic science.

This review critically examines practices and emerging perspectives in Raman spectroscopy for forensic engineering, particularly its application to cannabinoid analysis. By providing an overview of the



current literature and evaluating methodological advancements, the review aims to summarise the trends that are and might be followed in cannabis analysis using Raman spectroscopy.

RAMAN SPECTROSCOPY FOR THE ANALYSIS OF CANNABIS PLANT SAMPLES

The application of Raman spectroscopy to cannabis plants has advanced rapidly, reflecting its adaptability from fundamental microscopy to practical tools for cultivation and regulation. Research in this field has undergone a shift in focus from the cellular-level visualisation of cannabinoids to the use of portable spectrometers for field classification, crop monitoring and stress diagnostics. This comprehensive collection of works underscores the evolution of Raman from a mere laboratory technique to a multifaceted platform for both scientific and agricultural applications.

Ebersbach et al. (2018) provided an early demonstration of coherent anti-Stokes Raman scattering (CARS) microscopy to investigate individual glandular trichomes of *Cannabis sativa*. This non-labelling technique facilitated direct observation of cannabinoid distribution, notably delta-9-tetrahydrocannabinolic acid (THCA) and cannabidiolic acid (CBDA), without the necessity for destructive preparation. By producing chemical “fingerprints” at the cellular level, the study advanced the understanding of cannabinoid biosynthesis and storage, establishing Raman microscopy as a high-resolution, non-invasive alternative to conventional methods for plant tissue analysis. In this study, the authors used CARS microscopy because it produces a much stronger signal than conventional Stokes Raman scattering. Traditional Stokes Raman yields useful vibrational fingerprints but its weak signal requires long acquisition times, which can make imaging fragile plant tissues challenging. By contrast, CARS relies on a nonlinear interaction of laser beams to generate a bright anti-Stokes signal that is shifted to a higher frequency than the incident light. This coherent signal allows imaging to be performed more quickly and with higher spatial resolution, while lowering the risk of damaging the sample. These advantages make CARS particularly suitable for studying individual glandular trichomes of *Cannabis sativa*, where both sensitivity and tissue preservation are essential (Figure 1).

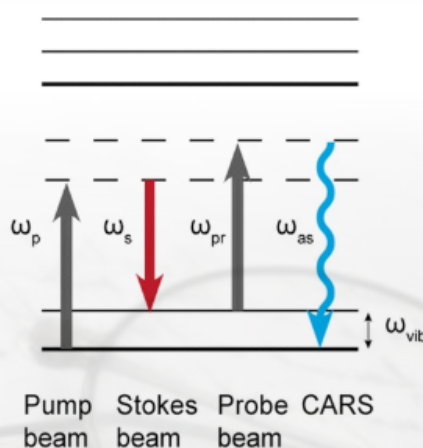


Figure 1: Illustration of the CARS process. A pump photon (ω_p) excites a molecule to a virtual state, which is influenced by a Stokes photon (ω_s). A probe photon (ω_{pr}), supplied from the same source as the pump in this setup, raises the molecule to a higher virtual level. The anti-Stokes signal (ω_{as}) that results is shifted to a higher frequency than the incoming light and, under the right conditions, becomes coherently amplified (adapted from Ebersbach et al., 2018).

The transition towards portable instrumentation for operational contexts was illustrated by Sánchez et al. (2020), who reported the use of an 831 nm portable Raman spectrometer to discriminate hemp from cannabis. Hemp and cannabis are distinguished by their THCA content, with cannabis containing much higher levels than hemp. The study showed that Raman spectroscopy can differentiate between the two with 100% accuracy and even quantify THCA, offering a non-invasive and reliable tool for regulation and breeding. This finding emphasised the confirmatory power of Raman in distinguishing legal hemp from illegal cannabis, a critical task in forensic and regulatory settings. Furthermore, extending the scope of classification, Ramos-Guerrero et al. (2022) demonstrated the use of Raman microscopy to analyse the trichome heads of cannabis plants, where cannabinoids are concentrated. The researchers carefully adjusted the laser settings to avoid damaging the samples and collected spectra from five marijuana varieties - four Sativa and one Indica. To interpret these data, they applied Orthogonal Partial Least Squares Discriminant Analysis (OPLS-DA) - chemometric analysis, and compared the spectra with pure cannabinoid standards delta-9-tetrahydrocannabinol (THC), cannabidiol (CBD), and cannabinol (CBN), as well as quantum-chemical simulations of acidic and neutral forms. This combined approach enabled them to clearly distinguish Indica from Sativa and even differentiate between individual Sativa strains, achieving 100% classification accuracy. Raman spectra of their results are shown in figure 2.

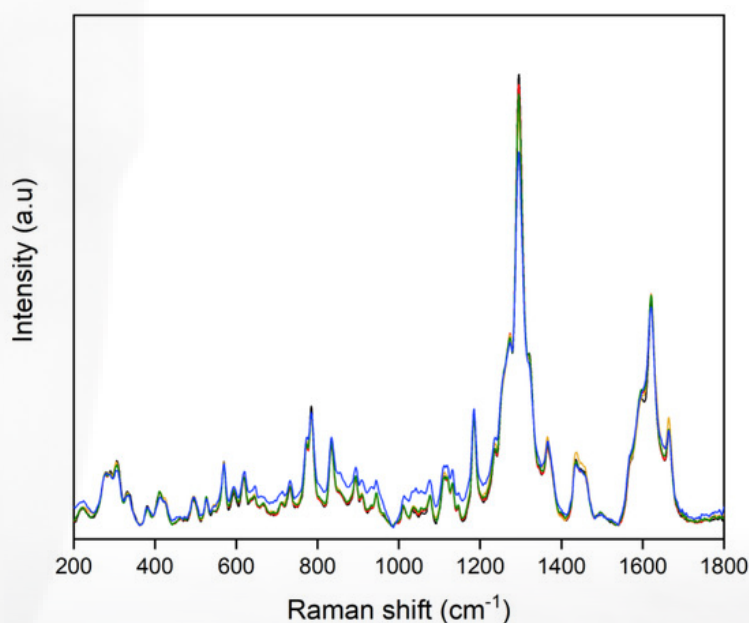


Figure 2: Comparison of average Raman spectra for Indica (Black Domina, black) and Sativa varieties (Amnesia Haze, red; Amnesia Hy-Pro, gold; Original Amnesia, blue; Y Griega, green) within the 200–1800 cm^{-1} range. The spectra appear broadly similar, with small differences in peak intensity and features (adapted from Ramos-Guerrero et al., 2022).

Applications also moved into the domain of cultivation and breeding. Goff et al. (2022) utilised a hand-held Raman spectrometer to differentiate hermaphrodite cannabis plants from male and female counterparts in vivo. Differentiating the sex of *Cannabis sativa* plants is important because only female plants produce trichomes that are rich in cannabinoids, while male plants do not. Hermaphroditic plants present an additional problem since they develop both female flowers and male anthers, which can fertilise females. This fertilisation reduces crop quality by leading to seed production and lowering cannabinoid content. Reliable sex identification therefore plays a key role in maintaining yield and ensuring the desired chemical composition of cannabis crops. The flowers of male, female, and hermaph-

roditic *Cannabis sativa* plants were examined with a 532 nm Raman laser, and spectra were collected from the calyx and trichome regions where cannabinoids are typically concentrated. Chemometric analysis, specifically OPLS-DA, was then applied to the spectral data to identify subtle biochemical differences linked to plant sex. This approach successfully classified all male and female plants with 100% accuracy and hermaphroditic plants with 98.7% accuracy; spectra are shown in Figure 3.

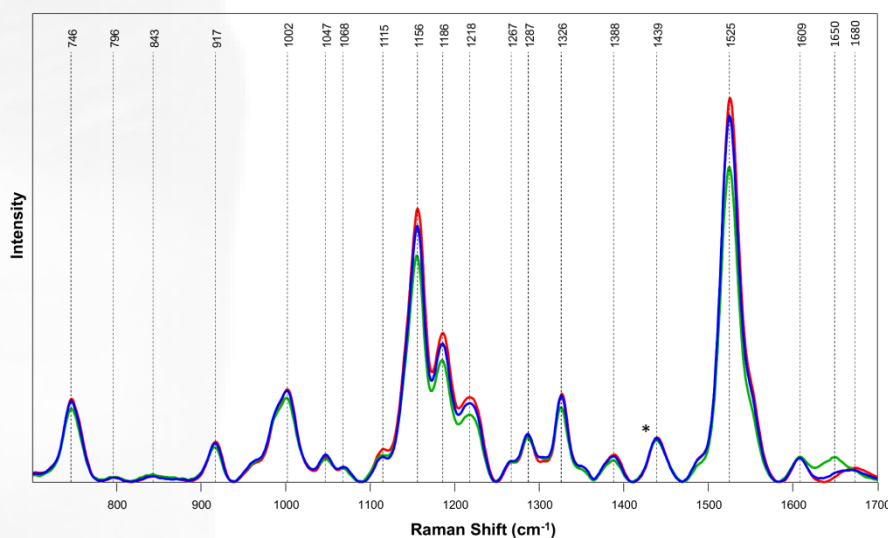


Figure 3: Averaged Raman spectra of *Cannabis sativa* leaves from male (blue), female (red), and hermaphroditic (green) plants, showing distinct spectral profiles used for sex classification (adapted from Goff et al., 2022).

In addition to its applications in genetic and morphological classification, Raman spectroscopy has also demonstrated its value in the assessment of plant responses to environmental stress. In a recent study, Steczkowski et al. (2023) utilised Raman spectroscopy to assess the effects of drought, heat, and light on various hemp varieties, identifying spectral alterations associated with carotenoids, lignin, and proteins. The outcomes of the study demonstrated the presence of both common and variety-specific stress responses, thereby underscoring Raman's capacity for early, non-destructive detection of abiotic stress and reinforcing its role in crop monitoring and precision agriculture. Cannabis plants exhibit distinct biochemical changes when exposed to environmental stressors such as drought, heat, or high light. These alterations can influence the production and distribution of key cannabinoids like THC and CBD, as well as their spectral signatures during analysis. In forensic contexts - whether in police laboratories, at border inspections, or in legal proceedings - accurate discrimination between hemp and cannabis is essential. Stress-induced chemical variation has the potential to complicate this distinction, underscoring the need for analytical methods capable of recognising and accounting for such effects.

In 2023, Dilena et al. examined how nitrogen fertilisation and pruning affect biomass production and cannabinoid yield in a CBD-type *Cannabis sativa* cultivar. Plants were cultivated in a glasshouse with coarse sand and, after a vegetative phase, were subjected to four nitrogen levels (30, 60, 210, and 500 mg/L) for twelve weeks under flowering conditions. A double stem pruning treatment was also applied, and at harvest, biomass, tissue nitrogen concentration, and cannabinoid levels in both leaves and inflorescences were quantified. The results showed that higher nitrogen levels increased vegetative growth, particularly leaf biomass, but caused a reduction in cannabinoid concentration and overall cannabinoid yield, while pruning had no positive effect. An additional observation revealed that plants grown on the edges of the greenhouse, exposed to greater sunlight, produced more biomass and cannabinoids, further highlighting environmental influences. These findings are forensically signifi-

cant because they demonstrate how cultivation practices and nutrient regimes can alter the chemical profile of cannabis. Stress or excessive fertilisation may reduce cannabinoid levels below legal thresholds, potentially complicating the distinction between hemp and drug-type cannabis. Recognising how environmental and agronomic factors shape cannabinoid content is therefore essential for ensuring accurate forensic classification and interpretation.

Table 1: Summary Raman Spectroscopy for the Analysis of Cannabis Plant Samples

Study	Sample	Method	Excitation (nm)	Chemometrics	Accuracy	Key Findings	Forensic Relevance
Ebersbach et al., 2018	Cannabis sativa glandular trichomes (single-cell)	CARS microscopy (nonlinear Raman)	NR	Qualitative spectral mapping	Fast imaging; qualitative THCA/CBDA mapping	Label-free visualisation of THCA/CBDA distribution; strong anti-Stokes signal enables faster imaging vs. Stokes Raman	Non-destructive localisation of cannabinoids; supports evidentiary integrity
Sánchez et al., 2020	Dried plant material (hemp vs. cannabis)	Handheld Raman	≈ 831	Classification (thresholding/chemometrics)	100% differentiation (hemp vs. cannabis)	100% differentiation hemp vs. cannabis; THCA quantification feasible	Rapid, non-destructive legal status screening in field/regulatory settings
Ramos-Guerreiro et al., 2022	Trichome heads; multiple varieties	Raman microscopy	NR	OPLS-DA + quantum-chemical simulations	100% Indica vs. Sativa; strain-level separation	100% classification of Indica vs. Sativa; differentiation among Sativa strains; spectral assignment improved by simulations	Varietal/chemotype discrimination; supports provenance and regulatory assessment
Goff et al., 2022	Leaves/flowers of male, female, hermaphrodite (in vivo)	Handheld Raman (532 nm)	532	OPLS-DA	100% male/female; 98.7% hermaphrodites	100% accuracy for male/female; 98.7% for hermaphrodites	Crop quality control; helps interpret seized plant material characteristics
Steczowski et al., 2023	Hemp varieties under drought/heat/light stress	Raman spectroscopy (bench/portable)	NR	Spectral feature analysis	Stress signatures detected (qualitative)	Detected common and variety-specific stress signatures (carotenoids, lignin, proteins)	Explains stress-induced chemical variability affecting legal thresholds
Dilena et al., 2023	CBD-type cultivar (N fertilisation + pruning)	Chemical quantification (paired with Raman context)	—	Quant / correlation analyses	Agronomic effect; not a Raman accuracy metric	Higher N increased biomass but reduced cannabinoid concentration/yield; pruning had no positive effect	Agronomy affects cannabinoid content; implications for hemp vs. drug-type determinations
Porcu et al., 2022	Cannabis material (THC/CBD)	1064 nm Raman (NIR to suppress fluorescence)	1064	Peak-based quant/ID	Qualitative ID (reduced fluorescence)	Rapid in-situ THC/CBD detection with reduced fluorescence interference	Improved on-site screening when fluorescence is problematic
Komisar et al., 2025	Living plants (leaf surfaces); standards/distillates	Handheld Raman	785, 830	PLS-DA, PCA	≈90% (chemotype classification, 830 nm)	~90% accuracy (830 nm) for THC-dominant vs. CBD-dominant chemotypes; phytocannabinoid-associated peaks identified	Field chemotype verification to support rapid decision-making

Most recently, Komisar et al. (2025) demonstrated the application of portable Raman spectroscopy for the classification of cannabis chemotypes. Using handheld devices equipped with 785 nm and 830 nm excitation sources, they collected spectra directly from the leaves of living plants, supplemented with



measurements of THC and CBD standards and distillates. The spectral data were analysed with Partial Least Squares Discriminant Analysis (PLS-DA), and the 830 nm spectrometer achieved approximately 90% accuracy in distinguishing THC-dominant from CBD-dominant chemotypes. Principal Component Analysis (PCA) further revealed phytocannabinoid-associated Raman peaks, indicating the potential for future quantitative profiling. These findings are important for forensic science, because they demonstrate that portable Raman instruments can provide rapid and reliable chemotype verification directly in the field, supporting timely decision-making in cultivation monitoring, border inspections, and law enforcement contexts.

In forensic contexts, Raman spectroscopy offers an invaluable means of distinguishing between different types of cannabis and assessing plant material without the need for destructive preparation. The instrument capacity for rapid chemotype classification, varietal identification, and the detection of plant stress markers provides tools that are directly applicable to law enforcement, regulatory inspection, and quality assurance of seized samples. The combination of portability with chemical specificity in Raman techniques has been demonstrated to enhance the reliability of plant-based forensic investigations and support legally defensible outcomes. Based on the studies above, Table 1 summarises the key findings and forensic relevance of utilising Raman spectroscopy for the analysis and discrimination of cannabis plant samples.

RAMAN SPECTROSCOPY FOR THE DETECTION OF CANNABINOIDS IN HUMAN SAMPLES

The application of SERS to the detection of cannabinoids in human samples has developed steadily, progressing from proof-of-concept demonstrations toward clinically relevant and forensic-ready workflows. Farquharson et al. (2017) conducted one of the earliest evaluations of a portable, point-of-care SERS saliva analyser. By directly comparing the results of the device with those of urinalysis, the study demonstrated that the device correctly identified the presence or absence of THC in 13 out of 14 patient samples. The nanoparticle substrates generated clear Raman signatures at concentrations relevant to human physiology, and the handheld design made it possible to conduct fast, on-site testing. This work established the practical potential of Raman-based devices as non-invasive alternatives for roadside, workplace, or emergency drug testing.

Expanding the scope of biofluid testing, Sivashanmugan et al. (2019) developed a portable SERS-based approach for detecting THC in biological fluids, specifically saliva and urine. The method employed diatomaceous earth substrates integrated with gold nanoparticles as SERS-active surfaces, enabling strong signal enhancement. Saliva samples were analysed directly, while urine required a thin-layer chromatography (TLC) separation step on diatomaceous channels to resolve THC from interfering compounds such as urea. With a portable 785 nm Raman device, the authors detected distinct THC vibrational bands at 1601 and 1681 cm^{-1} in saliva, and showed that TLC pretreatment allowed unambiguous THC identification in urine. Validation through PCA confirmed clear separation between THC-containing and control spectra. This article highlights the feasibility of Raman spectroscopy combined with SERS substrates for rapid and reliable on-site detection of THC in complex biological matrices, with direct relevance to forensic drug screening and law enforcement.

Figure 4 illustrates the findings of Sivashanmugan et al. (2019) on the effectiveness of combining TLC with SERS for detecting THC in urine samples. Before separation, the Raman spectrum of urine was dominated by strong signals from abundant metabolites such as urea, which masked the characteristic THC peaks and prevented reliable identification. After TLC separation on diatomaceous substrates,



the background interference was reduced, allowing clear THC-specific peaks to emerge. These results demonstrate that integrating TLC with SERS enables cannabinoids to be isolated from complex biological fluids and reliably detected, highlighting the forensic value of this approach for analysing drug metabolites in real-world samples.

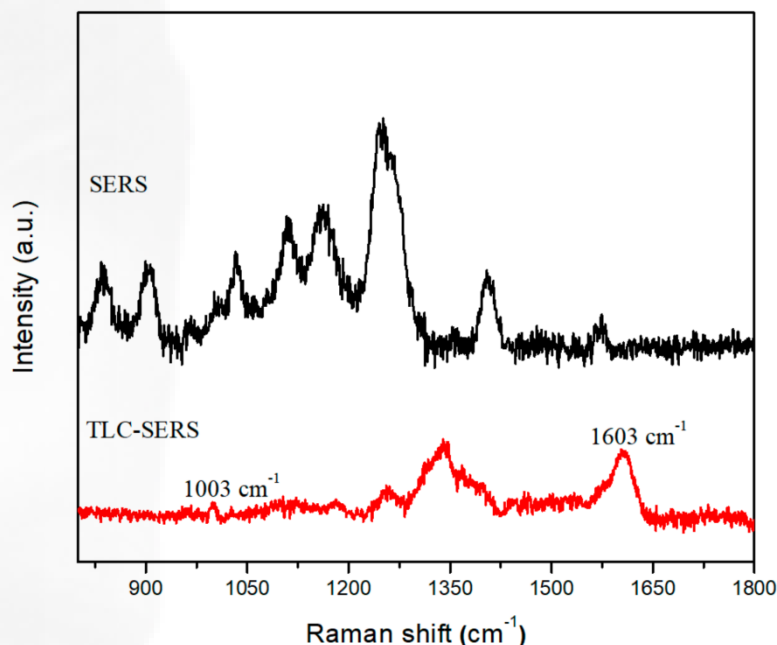


Figure 4: SERS analysis of a urine sample from a marijuana user, showing spectra collected prior to and following TLC separation (adapted from Sivashanmugan et al., 2019).

In order to further understand the molecular basis of detection, Islam et al. (2020) investigated the interactions of THC, CBD, CBN, and the synthetic analogue HU-210 with silver surfaces using SERS supported by density functional theory (DFT). The study showed that cannabinoids generally adsorb parallel to the silver surface via benzene rings and oxygen atoms, which yielded stable Raman enhancement. At the same time, small variations in adsorption geometry and band intensities allowed the compounds to be distinguished from one another. By comparing experimental vibrational bands with theoretical assignments, the study provided molecular-level insight into cannabinoid-surface interactions and demonstrated that spectral fingerprints can be linked directly to chemical structure. To further improve sensitivity, the authors evaluated different salts as enhancers, identifying MgCl_2 as the most effective due to its ability to increase local electric fields and generate more active SERS sites. Taken together, these findings advanced both the fundamental understanding of cannabinoid behaviour on metallic substrates and the practical refinement of SERS as a reliable tool for forensic drug detection. Açıkgöz and Çolak (2023) developed a novel approach for the detection of illicit drugs in human blood by combining SERS with advanced multivariate analysis. In their study, silver nanoparticles were synthesised and mixed with blood samples obtained from both drug users and controls to enhance the Raman signal of analytes. Spectra were collected using a 785 nm excitation laser, which provided strong enhancement of characteristic molecular vibrations. However, because blood is a chemically complex matrix with overlapping signals, traditional spectral interpretation alone was insufficient for reliable classification. To address this, the authors employed chemometric tools, specifically PCA for exploratory visualisation and PLS-DA for supervised classification. They applied

leave-one-out cross-validation (LOOCV) to verify that the classification model remained reliable and avoided overfitting. The method successfully separated blood samples spiked with drugs like MDMA and THC from negative controls, achieving this even at low concentration levels. These results highlight the potential of SERS, especially when combined with chemometric modelling, to deliver rapid and accurate drug screening in complex biological fluids. Importantly, this approach reduces the need for extensive sample preparation compared to traditional chromatographic methods and is well suited for forensic applications, where quick and reliable drug identification in biological samples is critical for investigations, toxicology assessments, and legal proceedings.

With regard to human sample analysis, Raman-based methods - in particular SERS - have been demonstrated to offer significant advantages in the context of forensic toxicology. The capacity to detect cannabinoids with high sensitivity in saliva, plasma, and even blood, utilising portable devices and minimal preparation, is well-suited to the requirements of roadside testing, workplace screening, and post-mortem analysis. Raman spectroscopy shows promise in overcoming persistent challenges in forensic drug testing, offering a rapid and accurate way to detect drugs in complex biological matrices with minimal sample handling. Consequently, it offers a pathway toward practical deployment in both investigative and judicial settings. It is important to highlight that only drops of blood, saliva or seminal fluid can often be found at a crime scene, and it is usually preferred to use these samples for DNA analysis, which can identify the person to whom the found sample belongs. Utilising Raman non-destructive methodology, it has become feasible to ascertain the state of the individual who left the trace, that is to say, whether they were in a state of intoxication. Table 2 compiles the outcomes of studies utilising Raman for detecting cannabinoids in human biological samples.

Table 2: Summary Raman Spectroscopy for the Detection of Cannabinoids in Human Samples

Study	Sample	Method	Excitation (nm)	Chemometrics	Accuracy	Key Findings	Forensic Relevance
Farquharson et al., 2017	Saliva	Portable SERS analyser	NR	Comparative evaluation vs. urinalysis	Undocumented	Demonstrated handheld SERS feasibility for on-site drug screening (model drug: buprenorphine)	Non-invasive, rapid roadside/workplace screening concept applicable to cannabinoids
Sivashanmugan et al., 2019	Saliva and urine	Portable SERS (Au NPs on diatomaceous earth) + TLC for urine	NR	PCA for validation	THC peaks in saliva; TLC+SERS confirms urine	THC peaks (~1601 & 1681 cm^{-1}) in saliva; TLC+SERS enabled unambiguous THC ID in urine	Rapid on-site THC detection; workflow handles complex urine matrix
Islam et al., 2020	THC, CBD, CBN, HU-210 (standards)	SERS (Ag) + DFT	NR	DFT band assignment; enhancer salt screening	DFT-assisted markers; enhancer optimisation (no single LoD)	Parallel adsorption via rings/oxygen; MgCl_2 best enhancer; markers differentiate cannabinoids	Guides substrate/condition choice for sensitive, selective SERS assays
Açıkgöz & Çolak, 2023	Whole blood (users vs. controls)	SERS (Ag NPs), 785 nm	785	PCA, PLS-DA, LOOCV	Class separation at low levels (PLS-DA)	Separated spiked/positive from controls at low levels	Toward rapid drug screening in complex biofluids with minimal prep



INNOVATIONS AND EMERGING TRENDS IN CANNABIS ANALYSIS BY RAMAN SPECTROSCOPY

As the field of forensic cannabis analysis has evolved, there has been a notable increase in the complexity of the analysis. This has resulted in the integration of advanced analytical and computational approaches into Raman procedure. The foundation for interpreting spectral data was laid by traditional chemometric tools. In more recent studies, the scope of Raman spectroscopy has been expanded through the use of computational modelling, machine learning, and artificial intelligence. Collectively, these innovations signify a transition from purely descriptive applications towards predictive, automated, and field-deployable forensic solutions.

In the early contributions, the importance of chemometric techniques for resolving complex spectral datasets from forensic samples was emphasised. As demonstrated in the relevant literature, such methods as PCA, partial least squares (PLS) regression, and OPLS-DA have been shown to be essential tools for exploratory analysis, classification, and quantification (Sánchez et al., 2020; Santos et al., 2022; Mojica et al., 2022). Refinements such as Competitive Adaptive Reweighted Sampling combined with PLS (CARSPLS) further enhanced quantification of drug and adulterant concentrations, thereby strengthening the statistical reliability of forensic evaluations (Santos et al., 2022).

The subsequent phase of development entailed the application of Raman spectroscopy to the differentiation of cannabinoids, utilising computational modelling. Ramos-Guerrero et al. (2022) combined Raman microscopy with OPLS-DA and quantum chemical simulations to classify cannabis varieties and distinguish THC, CBD, and CBN, improving spectral assignment and interpretability. Concurrently, Coombs et al. (2022) expanded Raman application to synthetic cannabinoids, demonstrating the detection of receptor agonists impregnated into paper substrates. This capability is directly pertinent to forensic screening in postal and correctional settings. In the context of this trajectory, Wolfe et al. (2023) undertook a comparative analysis of the experimental Raman spectra of eleven cannabinoids using density functional theory (DFT) simulations. This analysis led to the identification of reliable vibrational markers that differentiate between cannabinoids. Furthermore, it resulted in the refinement of spectral libraries for forensic and regulatory purposes.

Machine learning and artificial intelligence have since emerged as central to innovation in Raman-based forensic workflows. Laetsch (2024) applied Raman microscopy with transfer learning and linear discriminant analysis, achieving high accuracy in the classification of cannabinoid standards. Expanding on this, Laetsch et al. (2024) introduced convolutional neural networks (CNNs) trained on scalogram-transformed Raman spectra, achieving 100% classification accuracy and illustrating the potential for high-throughput, non-invasive analysis. Grijalva et al. (2024) combined Raman microscopy, DFT, and AI, demonstrating both PCA/LDA (99.83% accuracy) and CNN-based classification of seven cannabinoids, with scalogram-based image analysis yielding 100% accuracy in less than ten minutes of CPU training. These advances underscore the value of AI-enhanced Raman procedures in overcoming challenges posed by overlapping spectra and complex mixtures.

Recent studies have also addressed the quantification of cannabinoids using novel excitation approaches. Chuchuen et al. (2024) utilised near-infrared (NIR)-excited Raman spectroscopy for the quantification of THC, CBD, and CBN, achieving sub-0.5 mg/mL detection limits and strong linear correlations ($R^2 > 0.98$) between intensity and concentration. This work demonstrates the potential for Raman spectroscopy to provide sensitive, quantitative analysis in complex forensic contexts.

In the future, it is anticipated that advances will be made through the refinement of specialised Raman techniques and instrumentation. SERS continues to enhance sensitivity for trace-level detection, while SORS facilitates non-invasive analysis through packaging and containers (Akçan & Yildirim, 2021;



Mojica et al., 2022). The convergence of deep learning, portable instrumentation, and advanced chemometric modelling is expected to solidify the role of Raman as a versatile forensic tool.

Innovations in the domains of chemometric analysis, computational modelling, artificial intelligence, and advanced sampling geometries are reshaping the forensic use of Raman spectroscopy for cannabis. These developments are transforming Raman from a confirmatory laboratory technique into a predictive, portable, and legally defensible method capable of addressing the growing demands of forensic and regulatory cannabis analysis. Table 3 summarises the innovations and current trends in cannabis analysis using various Raman spectroscopy methods described above.

Table 3: Summary of Innovations and Emerging Trends in Cannabis Analysis by Raman Spectroscopy

Study	Sample	Method	Excitation (nm)	Chemometrics	Accuracy	Key Findings	Forensic Relevance
Spectroscopy Online (2020); AZoM (2019); Spicher (2016)	Various seized drugs/materials	Handheld Raman (785–1064 nm); SERS add-ons; reference libraries	785–1064	Library matching; peak-based confirmation	Presumptive ID; LoD varies by device/substance	Accurate presumptive ID of narcotics; broad applicability (fluids, fibres, explosives)	Rapid field triage; preserves chain-of-custody
Akçan & Yildirim, 2021; Mojica et al., 2022	Materials in opaque containers	Spatially Offset Raman Spectroscopy (SORS)	Offset geometry (various)	Spectral deconvolution / offset selection	Through-container ID (qualitative)	Non-invasive identification through packaging	Safer handling of hazardous materials/ clandestine lab items
Sánchez 2020; Santos 2022; Ramos-Guerrero 2022; Goff 2022	Plant materials, extracts, standards	Raman (532–1064 nm)	532–1064 (various)	PCA, PLS/PLS-DA, OPLS-DA; CARS-PLS	High-accuracy classification / improved quant	High-accuracy classification; improved quant of drugs/adulterants	Auditable decision-making for legal contexts
Laetsch et al. 2024; Grijalva 2024	Spectral datasets (cannabinoids)	Raman + CNNs/transfer learning; Raman+D-FT+AI	Various	Deep learning (CNNs), transfer learning	Near-perfect (reports up to 100%)	Near-perfect to 100% classification; fast training/inference	Automated, high-throughput workflows with strong generalisation
Chuchuen 2024; Porcu 2022	Extracts/solutions; plant material	785–1064 nm Raman; quantitative calibration	785–1064	Regression (e.g., PLS), peak ratios	Qualitative ID (reduced fluorescence)	Sub-0.5 mg/mL LoDs; strong linearity ($R^2 > 0.98$)	Sensitive, fluorescence-resistant quant in complex samples
Coombs et al., 2022	Paper/porous substrates (mail, prison)	Raman (bench/portable)	Various	Peak-based ID	Qualitative detection on substrates	Detects synthetics on impregnated substrates	Targeted screening in mailrooms and prisons

CONCLUSION

In both plant and human analysis, Raman spectroscopy has become a core part of the forensic workflow which is characterised by rapidity of this method, its reagents-independence, and its compatibility with chain-of-custody requirements. In cannabis studies, Raman spectroscopy can distinguish hemp from drug-type plants, classify varieties, monitor stress, and quantify cannabinoids such as THC, CBD, and CBN. In human samples, SERS enables sensitive cannabinoid detection while keeping material intact for DNA analysis. This allows investigators to connect identity with intoxication. Advances in chemometrics, computational modelling, and artificial intelligence further improve accuracy and classification. Together, these developments confirm Raman spectroscopy as a key method



for modern forensic investigations, with cannabinoids providing a strong example of its value. In conjunction with portable instrumentation and advanced sampling strategies, these advances serve to consolidate Raman spectroscopy as a field-deployable, courtroom-defensible technique for cannabis analysis. The ongoing refinement of data-driven workflows and instrumentation is set to consolidate its position further, thereby ensuring that Raman continues to serve as a pragmatic and authoritative component of contemporary forensic practice.

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