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E-mail: info@lawscience.com.ua
https://lawscience.com.ua/uk

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Editors office address:
National Academy of Internal Affairs
03035, 1 Solomianska Sq., Kyiv, Ukraine
Tel.: +38 (044) 520-08-47
E-mail: info@lawscience.com.ua
https://lawscience.com.ua/en

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Messenger correspondence as electronic evidence in criminal proceedings in Ukraine and abroad

Valerii Khakhanovskyi*
Doctor of Law, Professor
National Academy of Internal Affairs, lawyer
03035, 1 Solomianska Sq., Kyiv, Ukraine
https://orcid.org/0000-0001-5676-5641

Vitalii Petryk
Postgraduate Student
National Academy of Internal Affairs
03035, 1 Solomianska Sq., Kyiv, Ukraine
https://orcid.org/0000-0003-4723-7921

■ **Abstract.** As of 2025, over 94% of internet users use messaging apps on a monthly basis, leading to the growing role of electronic correspondence as a source of evidential information in criminal proceedings, particularly under martial law in Ukraine. The purpose of the study was to identify legal gaps in the regulation of messaging app correspondence as electronic evidence through a comparative analysis of the legal approaches of Ukraine, the United States of America, and the European Union. The study employed comparative legal and formal legal methods, along with the method of analysing judicial practice. The classification of messaging app correspondence was examined and systematised according to eight criteria, including the number of participants, access to correspondence, the format of information transmission, and the stage of creation. It was established that the current criminal procedural legislation of Ukraine does not distinguish a category of electronic evidence, whereas in the US, there is a developed system for the authentication of electronic evidence in accordance with the Federal Rules of Evidence, and the European Union adopted a dedicated Regulation (EU) 2023/1543 on cross-border access to electronic evidence in 2023. It was determined that Ukrainian courts generally recognise messaging correspondence as admissible evidence provided that the procedural rules for its collection are followed and there are no substantiated objections from the defence, although practice remains inconsistent. The grounds for deeming such correspondence inadmissible evidence have been analysed, including breaches of collection procedures, lack of confirmation of authorship, and the obtaining of evidence by unauthorised parties. The results of the study may be used by researchers, judges, prosecutors, and lawyers to improve the practice of working with electronic evidence in criminal proceedings, in addition to legislators for the regulatory framework of this institution

■ **Keywords:** digital forensics; admissibility of evidence; authentication; chain of custody; comparative legal analysis; procedural legislation

■ Introduction

The rapid development of digital technologies and the widespread use of mobile messaging apps have significantly altered the nature of public communication, shifting a substantial part of it into the digital sphere. As of 2025, the proportion of internet users who use messaging apps on a monthly basis exceeds 94%, with WhatsApp, Telegram, WeChat, and Messenger remaining the most popular platforms.

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■ *Corresponding author (*super-hvg@ukr.net*)

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Under martial law in Ukraine, the role of messaging apps has taken on particular importance: they have effectively become the primary, and in some cases the sole, means of communication between citizens, law enforcement agencies, and military units. Consequently, messaging app correspondence is increasingly emerging as a source of information regarding criminal offences, the circumstances of their planning and commission, and the circle of persons involved. However, the criminal procedure legislation of most states, including Ukraine, does not contain specific provisions regarding the procedure for collecting, recording, examining, and evaluating messaging app correspondence as electronic evidence. The absence of a unified regulatory approach leads to inconsistencies in judicial practice, which negatively affects the quality of evidence and the observance of the right to a fair trial. This necessitates a comprehensive comparative legal review aimed at identifying optimal approaches to the regulatory framework for this institution.

The issue of electronic evidence in criminal proceedings is the subject of active academic research both in Ukraine and abroad. For example, R. Stoykova (2021) identified three categories of unresolved threats to justice and the presumption of innocence when using digital evidence: inappropriate and inconsistent use of technology, outdated procedural safeguards that are not adapted to modern digital processes, and a lack of reliability checks in the practice of digital forensics. In a subsequent study, R. Stoykova (2023) argued that the right to a fair trial, enshrined in Article 6 of the European Convention on Human Rights[1], implicitly provides a conceptual framework for the development of universal rules regarding digital evidence at the investigation stage of criminal proceedings.

D. Wilson-Kovacs *et al.* (2023) examined the practice of defence lawyers in England and Wales regarding digital evidence and identified substantial difficulties in accessing, analysing, and presenting such evidence in court, specifically messages from WhatsApp and EncroChat. The authors concluded that improving lawyers' digital literacy is a key factor in ensuring the effective protection of clients' rights. S. Goodison *et al.* (2023), based on a survey of 50 prosecutors and 51 investigators in the United States, concluded that specialisation and continuous training play a critical role in working with digital evidence, emphasising that rapid technological changes require practitioners to constantly update their knowledge. A. Sachoulidou (2024) conducted a comprehensive analysis of the European Union's new legislation on cross-border access to electronic evidence – Regulation No. 2023/1543[2] and Directive No. 2023/1544[3] – and concluded that there has been a paradigm shift towards direct cooperation between competent national authorities and foreign service providers. V. Bajović & V. Ćorić (2025) analysed the judgment of the Court of Justice of the European Union of 30 April 2024 in Case No. C-670/22[4] (EncroChat) and its implications for the admissibility of intercepted messages from encrypted messaging services, in particular, regarding the requirements for a European Investigation Order. G. Horsman (2023), in a comprehensive Interpol review drawing on over 260 sources covering 2019-2022, noted major progress in the field of digital forensics, whilst highlighting unresolved issues regarding the standardisation and validation of methods for handling electronic evidence.

Among Ukrainian researchers, H. Avdieieva (2024) drew attention to issues related to the reliability and admissibility of electronic evidence in criminal proceedings, stressing the need to develop clear criteria for its assessment. T. Fomina & O. Rachynskyi (2023), having analysed investigative and judicial practice, concluded that there is an ambiguous understanding of the issue of collecting electronic evidence and proposed the use of the Berkeley Protocol[5] as a relevant tool in the context of armed aggression against Ukraine. I. Kalancha & D. Stemkovskyi (2025) conducted an examination of judicial practice regarding the use of electronic evidence in criminal proceedings in Ukraine and noted its inconsistency, providing recommendations for the development of a unified approach. A.M. Anheliuk (2023) reviewed problematic aspects of the use of electronic evidence in Ukrainian criminal procedural law, focusing on the practical difficulties of its application. P.Ye. Antoniuk & M.V. Hutsaliuk (2020) analysed the nature of electronic (digital) information as a source of evidence in criminal proceedings, justifying the need for its clear legal definition. I.V. Hora *et*

[1] Convention for the Protection of Human Rights and Fundamental Freedoms. (1950, November). Retrieved from https://zakon.rada.gov.ua/laws/show/995_004.

[2] Regulation of the European Parliament and of the Council No. 2023/1543 "On European Production Orders and European Preservation Orders for electronic evidence in criminal proceedings". (2023, July). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1543.

[3] Directive of the European Parliament and of the Council No. 2023/1544. (2023, July). Retrieved from https://eur-lex.europa.eu/eli/dir/2023/1544/oj/eng.

[4] Judgment of the Court of Justice of the European Union in Case C-670/22. (2024, April). Retrieved from https://curia.europa.eu/juris/liste.jsf?num=C-670/22.

[5] Berkeley Protocol on Digital Open Source Investigations. (2022). Retrieved from https://www.ohchr.org/sites/default/files/2024-01/OHCHR_BerkeleyProtocol.pdf.

al. (2024) investigated the place of digital forensics within the system of forensic knowledge, highlighting the emergence of a new scientific field directly related to the issue of electronic evidence.

Despite the significant contribution of the aforementioned researchers, a comprehensive comparative legal study of messaging app correspondence as a specific type of electronic evidence, considering the experience of various jurisdictions, has been overlooked, which defines the scientific novelty of the present work. The study aimed to identify legal gaps in the regulation of messaging app correspondence as electronic evidence in criminal proceedings through a comparative analysis of the legal approaches of Ukraine, the United States of America, and the European Union. The following tasks were formulated to achieve this goal: classify messaging app correspondence as electronic evidence; analyse judicial practice regarding the assessment of messaging app correspondence as evidence in criminal proceedings in Ukraine and abroad; formulate scientifically grounded proposals for improving criminal procedural legislation.

Materials and Methods

The study was conducted within the framework of the doctrine of admissibility of evidence in criminal proceedings, which is based on the principles of relevance, admissibility, reliability, and sufficiency of evidence, enshrined both in national legislation and in international standards of fair trial, in particular, in Article 6 of the Convention for the Protection of Human Rights and Fundamental Freedoms[1]. A range of scientific research methods was employed in the study. The classification method was used to systematise types of messaging app correspondence according to various criteria. The comparative legal method was used to compare legal approaches to the regulation of electronic evidence, particularly messaging app correspondence, in Ukraine, the United States of America, and the European Union. This method allowed identifying common trends and significant differences in regulatory frameworks and judicial practice across different jurisdictions. The formal-legal (dogmatic) method was applied to analyse legislative acts: the Criminal Procedure Code of Ukraine[2], the Federal Rules of Evidence[3] (USA), Regulation No. 2023/1543[4], Directive EU No. 2023/1544[5], and Directive No. 2014/41/EU[6]. This method was used to identify gaps and conflicts in current legislation. The method of analysing case law was used to examine the decisions of Ukrainian and foreign courts. The source base of case law was compiled on the basis of decisions available in the Unified State Register of Court Decisions of Ukraine, decisions of the Court of Justice of the European Union, and decisions of Canadian courts.

The selection of court decisions was compiled according to the following principle: 12 court decisions from Ukrainian courts of various instances (district courts, courts of appeal, the Supreme Court, and the Grand Chamber of the Supreme Court) were selected, handed down between 2022 and 2025, in which the subject of assessment was messaging app correspondence as evidence in criminal proceedings. The chosen time frame is due to the fact that it was during this period, under martial law, that there was a substantial increase in the number of criminal proceedings in which electronic correspondence was used as key evidence. Decisions were selected from various regions of Ukraine (Zaporizhzhia, Odesa, Lviv, and Volyn regions, and the city of Kyiv) to ensure the representativeness of the sample, allowing for potential regional differences in legal practice to be taken into account. The decisions were selected using the keywords “messenger”, “electronic correspondence”, and “messenger correspondence” via the search engine of the Unified State Register of Court Decisions. For comparative analysis, the decision of the Court of Justice of the European Union in Case No. C-670/22[7] (EncroChat), and the decision of the Supreme Court of Canada in R. v. Mills[8], were additionally included. The scope of the sample allows for the identification of key trends and issues, but does not claim to be an exhaustive representation of all judicial practice.

[1] Convention for the Protection of Human Rights and Fundamental Freedoms. (1950, November). Retrieved from https://zakon.rada.gov.ua/laws/show/995_004.

[2] Criminal Procedure Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.

[3] Federal Rules of Evidence of the United States. (2025, December). Retrieved from https://www.uscourts.gov/rules-policies/current-rules-practice-procedure.

[4] Regulation (EU) 2023/1543 of the European Parliament and of the Council “On European Production Orders and European Preservation Orders for Electronic Evidence in Criminal Proceedings”. (July 2023). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1543.

[5] Directive of the European Parliament and of the Council No. 2023/1544. (2023, July). Retrieved from https://eur-lex.europa.eu/eli/dir/2023/1544/oj/eng.

[6] Directive of the European Parliament and of the Council No. 2014/41/EU. (2014, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0041.

[7] Judgment of the Court of Justice of the European Union in Case No. C-670/22 (M.N. (EncroChat)). (2024, April). Retrieved from https://curia.europa.eu/juris/liste.jsf?num=C-670/22.

[8] Judgment of the Supreme Court of Canada in Case “R. v. Mills”. (1999, November). Retrieved from https://decisions.scc-csc.ca/scc-csc/scc-csc/en/item/1751/index.do.

Results

The variety of messaging applications and services, which differ in their properties and functionality, necessitates the systematisation of types of messaging in instant messengers. Such systematisation has not only theoretical but also direct practical significance, as the procedural order of its collection, methods of recording and criteria for assessing admissibility depend on the type of messaging. Based on the analysis conducted, a classification according to eight criteria is proposed, as presented in Table 1.

Table 1. Classification of messaging in instant messaging apps as electronic evidence

Classification criterion	Type	Characteristic
By number of participants	One-to-one chat (channel)	Involving one person
	Dialogue	Involving two participants
	Group chat	3 or more participants
By user access	Private	Invite-only or closed
	Public	Open to an unlimited number of people
By posting capability	Channels	Only authorised users can post
	Chats	Posting is available to all participants
By creation stage	Original	Stored on the original device
	Electronic copy	Photo, video, PDF, TXT, HTML formats
	Paper copy	Printouts of screenshots
By source	From the participant's device	Smartphone, computer, tablet
	From the service provider	Via the request mechanism
	From third parties	Persons aware of the correspondence
By format	Text	SMS, instant messaging apps, chats
	Multimedia	Photos, videos, audio, documents
By type of information	Content of correspondence	Text, files
	System information	Metadata: geolocation, date, time, IP
By response type	Chatbots	Automatic replies
	Artificial intelligence	AI for communication
	Live communication	Involving individuals

Source: developed by the authors

A systematic analysis of court decisions in criminal proceedings available in the Unified State Register of Court Decisions shows that courts generally recognise messaging app correspondence as admissible electronic evidence. The approaches of different courts to the assessment of this type of evidence vary significantly, indicating a lack of established practice and the need for its standardisation. Below are the most illustrative court decisions, which demonstrate both positive and negative practices regarding the recognition of messaging app correspondence as evidence.

In its Resolution of 12 June 2024 in Case No. 569/1908/23[1], the Supreme Court concluded that electronic (digital) evidence, in particular, materials from private messaging apps and Telegram channels, collected by operational units in compliance with the requirements of procedural law, constitute primary evidence in criminal proceedings concerning offences against the foundations of national security. This legal position of the Supreme Court is of fundamental importance, as it has, for the first time, clearly defined the status of electronic messages from messaging apps as primary, rather than merely supplementary, evidence in this category of criminal proceedings.

This conclusion has been applied in criminal cases No. 334/2045/24[2], No. 334/4126/24[3], No. 334/5278/24[4], No. 334/9999/23[5], in which the courts recognise the messaging correspondence submitted by the prosecution as admissible evidence

[1] Judgment of the Supreme Court of Ukraine in Case No. 569/1908/23. (2024, June). Retrieved from https://reyestr.court.gov.ua/Review/119741340.
[2] Judgments of Zaporizhzhia District Court in Cases No. 334/2045/24. (2024, December). Retrieved from https://reyestr.court.gov.ua/Review/123773129/.
[3] Judgments of Zaporizhzhia District Court in Cases No. 334/4126/24. (2024, December). Retrieved from https://reyestr.court.gov.ua/Review/123645637.
[4] Judgments of Zaporizhzhia District Court in Cases No. 334/5278/24. (2024, November). Retrieved from https://reyestr.court.gov.ua/Review/123523319.
[5] Judgments of Zaporizhzhia District Court in Cases No. 334/9999/23. (2024, August). Retrieved from https://reyestr.court.gov.ua/Review/121038824.

subject to two conditions: compliance with the legal requirements regarding the procedure for gathering evidence and the form of recording (inspection reports, attachments in the form of screenshots or files), in addition to the defence's inability to refute this evidence. In the judgment of the Khortytskyi District Court of Zaporizhzhia dated 6 January 2025 in case No. 337/862/23[1], the court assessed the messaging correspondence as proper, admissible, and reliable evidence, which, taken together with other evidence, proves the circumstances of the criminal offence beyond a reasonable doubt.

Nonetheless, there are frequent instances of courts rejecting messenger correspondence on the grounds specified in Articles 86 and 87 of the Code of Criminal Procedure of Ukraine[2]. Specifically, in its judgment of 29 February 2024, the Rozdilnyanskyi District Court of Odesa Region in Case No. 511/563/19[3] concluded that all evidence obtained during the pre-trial investigation was inadmissible, as the investigation had been conducted without a proper authorisation order. In the judgment of the Zhovkivsky District Court of Lviv Region dated 8 March 2024 in case No. 461/3477/22[4], the court noted that the reference to the report on the examination of mobile phones was procedurally incorrect, as no expert opinions had been provided to confirm that the correspondence via messaging app was indeed sent by the defendant.

It is also worth noting the ruling of the Appeals Chamber of the High Anti-Corruption Court dated 1 February 2022, No. 991/492/19[5], in which the court ruled that evidence gathered by investigators from the Territorial Department of the State Bureau of Investigation was inadmissible, on the grounds that it had been obtained by unauthorised persons in breach of the procedure established by law. Furthermore, the Grand Chamber of the Supreme Court, in its ruling of 21 June 2023 in case No. 916/3027/21[6], concluded that messages sent via messaging apps constitute electronic evidence, which is assessed by the court according to its internal conviction in conjunction with other evidence. However, the court may consider electronic correspondence as evidence only if it allows establishing the authors and the content of the correspondence.

In its judgment of 18 July 2024, the Turka District Court of Lviv Region in Case No. 458/465/22[7] rejected the prosecution's evidence, noting that the information in the screenshots did not allow for the unequivocal identification of the application, the authors, the time of the correspondence, or the connection between the content and the incident. The court concluded that electronic correspondence constitutes neither written nor electronic evidence to substantiate the commission of a crime. This decision illustrates a situation where the absence of clear regulatory criteria for assessing electronic evidence leads to its complete rejection by the court.

A summary of the analysed court decisions allows identifying the following main grounds for deeming messaging app correspondence inadmissible evidence: firstly, a breach of the procedural rules for gathering evidence, in particular, the absence of a proper order or the conduct of investigative actions by unauthorised entities; secondly, the lack of confirmation of the authorship of the messages, i.e. the inability to unequivocally establish that the defendant is the author of specific messages; thirdly, the failure to provide expert opinions on the authenticity and integrity of the electronic data; fourthly, the submission of evidence in a form that does not allow its origin and connection to the criminal offence to be established. Conversely, the admissibility of correspondence correlates with compliance with the procedural rules for recording, the existence of inspection reports with annexes, and the absence of substantiated objections from the defence.

In the legal system of the United States of America, the admissibility of electronic evidence, including instant messages and text messages, is governed by the Federal Rules of Evidence (FRE)[8]. Unlike Ukrainian legislation, the FRE contain clear rules of authentication applicable to all types of electronic evidence. Under Rule 901(a), the party presenting the evidence must provide sufficient grounds for concluding that

[1] Judgment of Khortytskyi District Court of Zaporizhzhia in Case No. 337/862/23. (2025, January). Retrieved from https://reyestr.court.gov.ua/Review/121038828.
[2] Criminal Procedure Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.
[3] Judgment of Rozdilnianskyi District Court of Odesa Oblast in Case No. 511/563/19. (2024, February). Retrieved from https://reyestr.court.gov.ua/Review/117324337.
[4] Judgment of Zhovkivskyi District Court of Lviv Oblast in Case No. 461/3477/22. (2024, March). Retrieved from https://reyestr.court.gov.ua/Review/117517325.
[5] Ruling of the Appellate Chamber of the High Anti-Corruption Court in Case No. 991/492/19. (2022, February). Retrieved from https://reyestr.court.gov.ua/Review/103002653.
[6] Resolution of the Grand Chamber of the Supreme Court of Ukraine in Case No. 916/3027/21. (2023, June). Retrieved from https://reyestr.court.gov.ua/Review/112088045.
[7] Judgment of Turkivskyi District Court of Lviv Oblast in Case No. 458/465/22. (2024, July). Retrieved from https://reyestr.court.gov.ua/Review/120455406.
[8] Federal Rules of Evidence of the United States. (2025, December). Retrieved from https://www.uscourts.gov/rules-policies/current-rules-practice-procedure.

the evidence is what the presenter claims it to be. Rule 901(b) provides ten non-exhaustive examples of methods of authentication, including: the testimony of a knowledgeable person (Rule 901(b)(1)), distinctive features of the content and other distinguishing characteristics (Rule 901(b)(4)), including metadata.

The decision in Lorraine v. Markel American Insurance Co.[1] is of fundamental importance to the practice of electronic evidence admissibility in the United States, in which Judge P. Grimm conducted an exhaustive analysis of five consecutive standards of admissibility: relevance (Rule 401), authenticity (Rule 901), absence of hearsay or application of exceptions (Rules 801-807), compliance with rules regarding the original (Rules 1001-1008), and the balance between probative value and bias (Rule 403). The court emphasised that the metadata of electronic documents (date, time, author identification) are distinctive characteristics that may be used for authentication under Rule 901(b)(4). This decision is recognised as a fundamental benchmark for the practice of admissibility of electronic evidence in US federal courts.

Notably, state courts have developed an approach to authenticating text messages through so-called "confirming circumstances", which include: registration of the mobile device in the defendant's name, password protection, the use of characteristic nicknames, and content consistent with the circumstances of the case. The courts consistently confirm that the mere fact of the sender's name being indicated in the message is insufficient for authentication; additional confirming circumstances are required, which is consistent with the approach of Ukrainian courts. A key difference between the US system and the Ukrainian one is that the Federal Rules of Evidence (FRE) also provide for the possibility of self-authentication of electronic records under Rule 902(13)-14, added in 2017, which allows electronic records to be recognised as authentic without additional evidence, provided there is certification by a qualified expert. Such a possibility is absent in Ukrainian procedural law, which complicates the burden of proof and increases the burden on the prosecution. These trends in the practice of federal courts are confirmed by a study by M. Novak (2020), who, having analysed the practice of US courts of appeal, noted an increase in the number of cases in which digital evidence plays a key role, and highlighted current issues regarding its admissibility and authentication.

In 2023, the European Union adopted Regulation No. 2023/1543[2], which enters into force on 18 August 2026. The Regulation establishes rules under which a judicial authority of one Member State may directly request electronic evidence from a service provider in another Member State, regardless of where the data is stored. The service provider is obliged to comply with the Production Order within 10 days, and in urgent cases within 8 hours. Of fundamental importance for the practice regarding the admissibility of intercepted messages from encrypted messaging services is the judgment of the Court of Justice of the European Union of 30 April 2024 in Case C-670/22 (EncroChat)[3]. In that case, the Court of Justice of the European Union held that a European Investigation Order (EIO) for the purpose of obtaining evidence already in the possession of the executing Member State may be issued only by a competent authority in accordance with the national law of the issuing state. The EncroChat case concerned the mass interception of messages from an encrypted messaging service used by organised criminal groups. In 2020, French and Dutch law enforcement agencies installed malware on EncroChat's servers, gaining access to millions of messages which were subsequently transferred to law enforcement agencies in other EU Member States via the EIO mechanism.

In parallel with the EU Regulation, the United States of America adopted the Clarifying Lawful Overseas Use of Data Act (CLOUD Act) in 2018[4], which allows US law enforcement agencies to request data from American technology companies regardless of where the data is stored. Both instruments, the EU Regulation and the CLOUD Act, depart from the principle whereby jurisdiction is determined by the physical location of data storage, reflecting a global trend towards simplifying cross-border access to electronic evidence. For Ukraine, this trend is of particular significance, as the servers of most popular messaging apps (Telegram, WhatsApp, Signal) are located abroad, which greatly complicates the procedure for obtaining electronic evidence through the mechanism of international legal assistance. Currently, Ukrainian legislation does not provide for a mechanism for direct access to foreign service providers, which necessitates the integration of relevant provisions.

[1] Judgment of the United States District Court, D. Maryland in Case "Lorraine v. Markel American Insurance Co.". (2007, May). Retrieved from https://app.minerva26.com/case_law/17344-lorraine-v-markel-am-ins-co.
[2] Regulation of the European Parliament and of the Council No. 2023/1543 "On European Production Orders and European Preservation Orders for Electronic Evidence in Criminal Proceedings". (2023, July). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1543.
[3] Judgment of the Court of Justice of the European Union in Case No. C-670/22 (M.N. (EncroChat)). (2024, April). Retrieved from https://curia.europa.eu/juris/liste.jsf?num=C-670/22.
[4] Clarifying Lawful Overseas Use of Data Act (CLOUD Act) of U.S. (2018, March). Retrieved from https://www.congress.gov/bill/115th-congress/house-bill/4943.

The Supreme Court of Canada, in the case of R. v. Mills[1], concluded that electronic correspondence is admissible evidence, and a copy of such correspondence captured in a screenshot is also deemed admissible, provided its authenticity is confirmed. The Canadian approach is characterised by pragmatism, as the court assesses, first and foremost, the reliability and credibility of the evidence rather than formal compliance with procedural requirements, which differs from the more formalised approach in both Ukraine and the US.

In the UK, the admissibility of digital evidence is governed primarily by the exclusion rules set out in the Police and Criminal Evidence Act 1984 (PACE)[2]. British courts take a flexible approach, assessing three aspects of potential evidence: relevance, reliability, and fairness of its use. The practice of using EncroChat data in UK criminal cases has demonstrated that intercepted messages from encrypted messaging apps are recognised as admissible evidence provided the procedure for obtaining them is followed. However, British defence lawyers face significant difficulties in challenging the reliability of such evidence due to limited access to technical information regarding the methods used to intercept it.

Thus, a comparative analysis of the legislation and practice across four jurisdictions allows for the identification of three main approaches to the regulation of electronic evidence from messaging apps. The first is the formalised approach (US), under which authentication is performed in accordance with codified rules with clear admissibility criteria. The second is the pragmatic approach (UK, Canada), under which the court assesses evidence on the basis of its substance and reliability, rather than formal criteria. The third is the EU's combined approach, which provides for regulatory control at the supranational level (Regulation 2023/1543) with the discretion of national courts regarding the assessment of admissibility. Ukraine currently leans towards the pragmatic approach, but without an adequate regulatory framework, which creates uncertainty and inequality in the application of the law.

Based on the comparative analysis conducted, the need to improve Ukraine's criminal procedural legislation is substantiated. In particular, it is proposed to amend Article 99 of the CPC of Ukraine[3] by introducing a definition of electronic evidence that would cover information in electronic (digital) form contained on electronic media, including correspondence in messaging apps. Furthermore, it is advisable to include a separate Article in Chapter 15 of the CPC of Ukraine regarding the procedure for temporary access to electronic communications, as well as to amend Articles 86-87 of the CPC of Ukraine, establishing specific requirements for the procedure for collecting and recording electronic evidence, specifically the mandatory recording of metadata (date, time, IP address, device and account identifiers). The experience of the US, where the FRE Rule 902(13)-14[4] provides for the self-authentication of electronic records, and the EU, where Regulation No. 2023/1543[5] establishes clear timeframes and procedures for the production of electronic evidence, can be cited as confirmation of the advisability of such changes.

Discussion

The results of this study allow for a comparative analysis with the findings of other researchers and reveal both similarities and differences in the understanding of the issue of using messaging app correspondence as electronic evidence. One of the key issues identified during the analysis of Ukrainian judicial practice is the lack of a uniform approach to the authentication of electronic messages. Ukrainian courts assess messaging app correspondence primarily "in conjunction with other evidence", which does not always ensure proper verification of authenticity. The conclusions drawn by R. Stoykova (2023) regarding the need to develop fair trial-based rules for digital evidence are relevant, as the results of this study confirm that the absence of clear regulatory requirements for the authentication of messaging leads to inconsistencies in judicial practice. Unlike in Ukraine, the United States of America has a systematic approach to authentication, enshrined in Federal Rule of Evidence 901, which includes specific methods for verifying the authenticity of electronic communications. The reason for these discrepancies lies in the fact that the American legal system has a long-standing tradition of regulatory control over electronic evidence, whereas in Ukraine, the development of the relevant legal framework has only just begun.

[1] Judgment of the Supreme Court of Canada in Case "R. v. Mills". (1999, November). Retrieved from https://decisions.scc-csc.ca/scc-csc/scc-csc/en/item/1751/index.do.
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The findings of D. Wilson-Kovacs *et al.* (2023) regarding the difficulties faced by defence lawyers when dealing with digital evidence are consistent with the results of this analysis. In particular, the cases examined revealed that the defence often fails to file motions requesting an expert examination of electronic evidence or seeking to have it declared inadmissible, which effectively facilitates the court's acceptance of such evidence. However, the analysis also reveals a different picture: in cases where the defence actively contested the authenticity and authorship of correspondence (in the case of the Zhovkivsky District Court of Lviv Region), the courts concluded that such evidence was inadmissible. This confirms the thesis of the aforementioned researchers regarding the critical role of digital literacy among lawyers in ensuring fair trial proceedings.

The results of a comparative analysis with EU legislation confirm the conclusions of A. Sachoulidou (2024) regarding a paradigm shift towards direct cooperation with service providers. Regulation No. 2023/1543[1] sets specific deadlines for the execution of Production Orders, which differs significantly from Ukrainian practice, where obtaining electronic evidence from messaging service providers remains a lengthy and informalised process. The statements of H. Avdieieva (2024) regarding the reliability of digital evidence in criminal proceedings are well-founded, as the findings of this study further confirm that Ukrainian courts face difficulties in assessing the reliability of messaging correspondence, particularly when it is submitted in the form of screenshots without metadata.

An analysis of the EncroChat[2] case and the conclusions of V. Bajović & V. Ćorić (2025) demonstrate that the issue of the admissibility of intercepted messages from encrypted messaging apps is relevant not only for Ukraine but also for the entire European Union. The EU Court's ruling established important procedural safeguards regarding the issuance of EIOs, which may serve as a benchmark for the development of Ukrainian legislation in the field of international cooperation in the collection of electronic evidence, the importance of which was underlined by N. Akhtyrska (2022). In this context, a study by N. Akhtyrska & O. Kostiuchenko (2022) is also notable, devoted to the procedural and organisational aspects of gathering electronic evidence within the framework of international cooperation, which further confirms the complexity and multifaceted nature of the problem of cross-border acquisition of digital evidence.

The observation by O. Harasymiv *et al.* (2023) regarding the lack of clarity in understanding the difference between written and electronic evidence is corroborated by the court decisions analysed. In the case of the Turka District Court of Lviv Region, the court concluded that electronic correspondence is "neither written nor electronic evidence", which clearly illustrates the problem highlighted by the aforementioned researchers. The conclusions of these authors, considering the results of this study, can be viewed from a different perspective: the problem lies not so much in a vague understanding of the difference, but in the absence of a statutory definition of electronic evidence in the Code of Criminal Procedure of Ukraine, which deprives the courts of a clear guideline.

The recommendations of T. Fomina & O. Rachynskyi (2023) on the use of the Berkeley Protocol[3] appear reasonable, but require adaptation to the specific nature of messaging app correspondence, as the protocol was developed primarily for the verification of open-source intelligence (OSINT), whereas messaging app correspondence is, by its very nature, closed and requires specific access procedures. I.V. Basysta & L.V. Havryliuk (2024) investigated the practice of using digital data from open sources in the investigation of criminal offences, outlining both the potential and the procedural difficulties of such an approach.

Nonetheless, the results of a comparative analysis indicate that the most effective path to improvement is a comprehensive approach that combines the statutory codification of requirements for electronic evidence (following the example of the FRE in the US), mechanisms for cross-border access (following the example of the EU Regulation), and the development of specialisation among law enforcement officers and judges in the field of digital evidence (in accordance with the recommendations of S.E. Goodison *et al.* (2023).

Particular attention is drawn to the issue of classifying messaging app correspondence, as proposed within this study. The identification of eight classification criteria (based on the number of participants, access, storage capability, creation stage, source of origin, format, type of information, and method of response) constitutes an original contribution that builds upon the approaches of A. Kovalenko (2023) regarding the classification of digital traces of criminal offences. However, whilst A. Kovalenko (2023)

[1] Regulation of the European Parliament and of the Council No. 2023/1543 "On European Production Orders and European Preservation Orders for Electronic Evidence in Criminal Proceedings". (2023, July). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1543.

[2] Judgment of the Court of Justice of the European Union in Case No. C-670/22 (M.N. (EncroChat)). (2024, April). Retrieved from https://curia.europa.eu/juris/liste.jsf?num=C-670/22.

[3] Berkeley Protocol on Digital Open Source Investigations. (2022). Retrieved from https://www.ohchr.org/sites/default/files/2024-01/OHCHR_BerkeleyProtocol.pdf.

concentrated on the technical characteristics of digital traces in general, the classification in this study is specifically oriented towards the procedural significance of different types of correspondence, which has direct practical value for judges and lawyers when assessing the admissibility of a specific type of digital evidence.

The three approaches to the regulation of electronic evidence identified in the study, formalised (USA), pragmatic (UK, Canada), and combined (EU), are consistent with the findings of K. Ligeti *et al.* (2021) regarding the diversity of admissibility standards across EU member states. Thereby, K. Aksamitowska (2021), having examined the practice of using digital evidence in the investigation of international crimes in Germany, Sweden, Finland and the Netherlands, demonstrated that even in states with developed legal systems, significant procedural challenges remain when dealing with electronic evidence, which reinforces the conclusion regarding the universal nature of the identified issues. For Ukraine, which is in the process of harmonising its legislation with the EU acquis, a combined approach appears to be the most promising, as it allows for the combination of clear regulatory frameworks with the flexibility of judicial discretion. The practical implementation of this approach requires both legislative changes (amendments to the Code of Criminal Procedure of Ukraine) and the development of specialised training for judges, prosecutors, and lawyers in the field of working with digital evidence.

■ Conclusions

The subject of the study was messaging app correspondence as electronic evidence in criminal proceedings. The objective set – to identify legal gaps in the regulation of this type of evidence through a comparative analysis of the legal approaches of Ukraine, the US and the EU – was achieved through a comprehensive analysis of legislative acts, judicial practice, and academic publications. It was established that messaging constitutes a distinct category of electronic evidence, characterised by specific features: creation and modification using computer devices, storage on various media and providers' servers, the ability to be reproduced multiple times without loss of quality, and increased vulnerability to modification and destruction. The author proposes a classification of messaging based on eight criteria, which is of practical significance for determining the procedural status of a specific type of electronic evidence. An analysis of the legislation helped establish that the current Code of Criminal Procedure of Ukraine does not contain specific provisions regarding electronic evidence; in particular, it does not define the concept of electronic evidence nor does it establish special requirements for the procedure for collecting, recording and assessing correspondence in messaging apps, whereas in the US and the EU, the relevant legal frameworks are significantly more developed. The results of the study showed that Ukrainian courts generally recognise messaging correspondence as admissible evidence provided that procedural rules are followed and there are no well-founded objections from the defence; however, practice remains inconsistent, as evidenced by diametrically opposed decisions by different courts on similar issues. Such data indicate the need for clear rules governing the handling of electronic evidence to be enshrined in legislation. The analysis identified key grounds for deeming correspondence inadmissible: breaches of collection procedures, lack of confirmation of authorship, evidence obtained by unauthorised parties, and the submission of evidence in a form that does not allow its origin to be established. A comparative analysis established that the systematic approach to authentication developed in the US (FED Rule 901) and the mechanisms for cross-border access provided for in Regulation No. 2023/1543 can serve as a benchmark for the development of Ukrainian legislation. The results obtained suggest that the proposed amendments to Article 99, Chapter 15, and Articles 86-87 of the Code of Criminal Procedure of Ukraine will contribute to the formation of a uniform judicial practice and improve the quality of evidence.

In summary, the effective use of messaging app correspondence as electronic evidence requires a comprehensive approach combining regulatory frameworks, the development of specialisation among law enforcement officers and judges, and international cooperation. Conceptually, the above indicates the emergence of a new institution of electronic evidence in criminal proceedings, which requires both theoretical justification and practical testing.

A limitation of the study was the relatively small sample size of court decisions (12 cases) and the lack of full texts of some decisions in the public domain. Promising areas for further research include an empirical examination of the practice of collecting electronic evidence by Ukrainian law enforcement agencies and the development of methodological guidelines for judges on assessing the authenticity of messaging app correspondence using specialist knowledge.

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■ Conflict of Interest

None.

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Листування в месенджері як електронний доказ у кримінальному судочинстві України та закордоном

Валерій Хахановський
Доктор юридичних наук, професор
Національної академії внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ, Україна
https://orcid.org/0000-0001-5676-5641
Віталій Петрик
Аспірант
Національної академії внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ, Україна
https://orcid.org/0000-0003-4723-7921

■ **Анотація.** Станом на 2025 рік понад 94 % користувачів мережі Інтернет щомісяця використовують месенджери, що зумовлює підвищення ролі електронного листування як джерела доказової інформації в кримінальних провадженнях, зокрема в умовах воєнного стану в Україні. Метою дослідження було виявлення правових прогалин у регулюванні листування в месенджерах як електронного доказу шляхом порівняльного аналізу правових підходів України, Сполучених Штатів Америки та Європейського Союзу. У процесі дослідження було використано порівняльно-правовий, формально-юридичний методи, а також метод аналізу судової практики. Було досліджено та систематизовано класифікацію листування в месенджерах за вісьмома критеріями, зокрема за кількістю учасників, доступом до листування, форматом передання інформації та етапом створення. Встановлено, що чинне кримінальне процесуальне законодавство України не виокремлює категорію електронних доказів, тоді як у Сполучених Штатах Америки є розвинена система автентифікації електронних доказів відповідно до Federal Rules of Evidence, а Європейський Союз 2023 року ухвалив спеціалізований Регламент (EU) 2023/1543 про транскордонний доступ до електронних доказів. Виявлено, що українські суди здебільшого визнають листування в месенджерах допустимим доказом за умови дотримання процесуального порядку збирання й за відсутності обґрунтованих заперечень сторони захисту, однак практика є суперечливою. Проаналізовано підстави визнання такого листування недопустимим доказом, зокрема порушення процедури збирання, неможливість підтвердження авторства й отримання доказів неуповноваженими суб'єктами. Результати дослідження можуть бути використані науковцями, суддями, прокурорами та адвокатами для вдосконалення практики роботи з електронними доказами в кримінальних провадженнях, а також законодавцем для нормативного врегулювання цього інституту

■ **Ключові слова:** цифрова судова експертиза; допустимість доказів; автентифікація; ланцюг збереження доказів; порівняльний правовий аналіз; процесуальне законодавство

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Strategies for counteracting obstruction of pre-trial investigations into criminal offences in the context of official duties

Oleksandr Amelin*
PhD in Law, Associate Professor
Office of the Prosecutor General
01011, 13/15 Riznytska Str., Kyiv, Ukraine
Educational and Scientific Institute of Law of State Tax University
08201, 31 Universytetska Str., Irpin, Ukraine
https://orcid.org/0000-0002-0933-2111

■ **Abstract.** The study aimed to identify strategies for countering obstruction and to develop a system of tactical approaches to protect pre-trial investigations into official misconduct from disruptive influences. The research was based on a combination of comparative legal analysis, quantitative analysis of official statistical data, and qualitative analysis of judicial and investigative practice. Based on a comparative legal analysis of legislation and case law in Ukraine, the United States of America and the Federal Republic of Germany, a systematisation of tools for neutralising and overcoming resistance from specific actors was conducted. The study established that, in contrast to retrospective countermeasures, the strategy of threat neutralisation involves the pre-emptive freezing of a suspect's administrative and financial resources before irreversible consequences arise. The analysis of empirical data has confirmed the effectiveness of a three-tiered response system to counter-investigation activities, which involves a combination of financial, technological and procedural measures. The study determined that the priority approach is to deprive the official of economic benefit, as evidenced by the practice of asset freezing in foreign jurisdictions and the use of settlement agreements. The effectiveness of using mass decryption of encrypted messaging apps and blockchain analysis to identify hidden links in high-tech schemes involving cryptocurrency mixers has been demonstrated. This research demonstrated the need to implement international standards of accountability for interference with the administration of justice and to expand the powers of anti-corruption bodies to intercept information autonomously from telecommunications networks to minimise leaks. The practical value of the study is determined by the potential for direct application of the proposed recommendations to improve criminal procedure legislation

■ **Keywords**: influence; pressure; threats; overcoming; evidence; seizure of assets; plea agreements; search; investigative measures; offences in the course of duty; corruption; case law

■ Introduction

The research relevance is determined by the radical transformation of the mechanisms used to obstruct the investigation of criminal offences in the sphere of official duties, which, in the context of martial law and European integration processes, has taken on the characteristics of a high-tech, coordinated and well-resourced operation. Modern official crime, exploiting legislative loopholes and administrative influence, has shifted the focus from the primitive destruction of evidence to the creation of complex intellectual obstacles, requiring pre-trial investigation bodies to change their response paradigm: from

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■ *Corresponding author (*yuamelinoleksandr@gmail.com*)

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reactively overcoming the consequences to proactively neutralising threats.

The extent to which this issue has been explored in academic research is reflected in the considerable interest shown by scholars in specific aspects of countermeasures. The fundamental underpinnings of crimes committed in the course of senior-level official duties, and the specific means employed by specialised actors to evade accountability, were examined by M.L. Benson *et al.* (2024). The study demonstrated that high-ranking actors exploit institutional loopholes as "windows of opportunity" to commit and conceal crimes and revealed the symbiotic links between state and corporate crime, which require specific control methods. P. Gottschalk (2024) analysed the institutional barriers and challenges faced by national anti-corruption bodies in various countries, identifying patterns of organisational resistance at the level of state structures and illustrated the dilemmas faced by governments when auditing such bodies.

An analysis of the nature and structure of the mechanism for obstructing investigations was conducted by O. Tarkan (2025), identifying the structural elements of this activity and the stages of its implementation in the context of a criminal conflict. The study argued that the mechanism of obstruction is a dynamic phenomenon involving preparation, active interference with evidence and the concealment of traces, which necessitates the integration of the forensic characteristics of obstruction into investigative methodology. The specifics of administrative investigations and the phenomenon of using bureaucratic procedures as a "psychological weapon" against regulatory bodies were studied by A.A. Gavoor & S.A. Platt (2022). Using specific case studies, the researchers demonstrated how protracted and non-transparent investigations can be used to exert pressure on businesses, which is key to determination of the limits of the authorities' powers. The psychological aspects of the behaviour of those involved, in particular the self-justification techniques (guilt neutralisation) used by fraudsters during interrogations, were the subject of a study by K. Majid & A. Kapure (2025). Their findings identified key defence strategies employed by suspects, such as denying harm or shifting blame, and proposed methods for countering them during investigative proceedings.

A separate section of studies was devoted to tactical techniques and procedural measures aimed at obtaining evidence in conflict situations. For instance, O.Yu. Amelin (2025a) analysed the body search as a tool for gathering evidence in criminal proceedings concerning unlawful gain. The study demonstrated the synonymy of the terms "personal search" and "body search" and justified the need to simplify the procedure for conducting such searches under martial law to improve efficiency. The issues of tactical support for the investigation of corruption offences and the role of preventive measures were examined by M.O. Kassimova *et al.* (2023). The researchers analysed the concept of investigative prevention in the post-Soviet space and concluded that current legislative regulation is often insufficient for the full realisation of this potential. The authors emphasised that eliminating formalism in approaches to crime prevention is a key factor in enhancing the effectiveness of the fight against corruption.

The issue of ensuring the safety of participants in criminal proceedings and preventing interference with them was examined by O. Krykunov *et al.* (2023). Their study justified the expediency of granting operational units the right to immediately monitor individuals identified during searches, with a view to the early prevention of threats to witnesses. Meanwhile, V. Cherniei *et al.* (2022) highlighted criminal law and institutional instruments, highlighting certain inconsistencies between Ukrainian state policy and international standards governing the interaction between the authorities and the public. The researchers emphasised that the system of measures to combat corruption must be based on the principles of publicity, transparency and the inevitability of punishment. The limits of procedural influence were demonstrated by H. Boreiko & V. Navrotska (2023) in a comparative analysis of the abuse of the right to prosecute in Ukraine and the USA. The study determined that the improper use of discretionary powers by a prosecutor undermines the interests of justice in both jurisdictions. This necessitates the development of legitimate measures to counter procedural obstruction to safeguard the rights of parties to the proceedings.

Despite a substantial body of academic research, the sources analysed did not clearly distinguish between the concepts of "overcoming" (as a reactive action) and "neutralisation" (as a proactive action), specifically in the context of service-related offences. Most authors treated these processes as synonymous or in a fragmented manner, emphasising individual investigative actions whilst neglecting a comprehensive strategy that combines procedural, tactical and administrative measures. Furthermore, the issue of adapting international experience to the realities of martial law in Ukraine remained insufficiently researched.

The study aimed to identify strategies for countering resistance and to develop a set of techniques for mitigating threats to the investigation of official crimes. To achieve this aim, the following tasks were set: to establish the substantive differences between the concepts of "overcoming" and "neutralisation"; to conduct a comparative analysis of the effectiveness of countermeasures in Ukraine, the USA and Germany; and to develop practical recommendations

for ensuring the technical and institutional autonomy of investigative bodies.

Materials and Methods

The methodological framework of the study was based on a comprehensive interdisciplinary approach, incorporating dogmatic, comparative legal and empirical methods. The geographical scope of the study covered the legal systems of Ukraine, the United States of America (USA) and the Federal Republic of Germany (FRG). The choice of these jurisdictions was dictated by the need to compare Ukrainian practice, which is developing under the conditions of martial law, with the experience of countries that have well-established institutions for combating official corruption. The US legal system was chosen as the benchmark model for the application of plea bargain agreements and liability for obstruction of justice. Meanwhile, the experience of the FRG is relevant due to its membership of the Romano-Germanic legal family and the existence of progressive practices for neutralising cyber threats. In particular, the study compares German algorithms for the preventive "freezing" of data and methods for overcoming obfuscation of digital traces to neutralise the remote deletion of evidence even before searches commence.

The research process was structured in four stages. In the first stage, a method of semantic and legal analysis was applied to fundamental works in the field of criminal procedure, in particular, the monographic study by M.S. Tsutskiridze (2020). The choice of this source is due to its status as a foundational theoretical work, in which the nature of criminal procedural activity in conditions of conflict was conceptualised for the first time at a systemic level, and tactical foundations for neutralising opposition were proposed. This method was used to distinguish the substantive content of the categories of "overcoming" and "neutralisation" based on the temporal vector of investigative influence, namely retrospective (elimination of the consequences of the counteraction committed) or proactive (prevention of potential threats). Given the absence of direct definitions in legislation, their functional equivalents were analysed: in Ukraine, procedural mechanisms for the collection and securing of evidence (Chapters 17, 21) of the Criminal Procedure Code of Ukraine[1] concerning the seizure of property and covert investigative (search) actions; in the USA, the concept of obstruction of justice[2]; in Germany – provisions of the German Criminal Code[3] (§ 258, 258a StGB). To determine the legal limits on the application of procedural coercive measures and to define the scope of the investigator's powers, a formal-legal method was employed, which was used for an analysis of the relevant provisions of the Criminal Code of Ukraine (CC)[4] and the Criminal Procedural Code of Ukraine (CPC)[5].

In the second stage, statistical analysis was applied to data from the Office of the Attorney General (n.d.) for the period 2022-2025, to verify trends in official corruption and analyse the use of pre-trial detention as a preventive measure in the context of neutralising the influence of those implicated. Reports from the National Anti-Corruption Bureau of Ukraine (NABU) (2024; 2025) were also examined to identify the most common forms of obstruction, in particular, information leaks and the blocking of access to data. The identification process was conducted by searching the texts for semantic markers ("interference", "pressure", "data destruction", "discrediting").

The third stage was based on a case study approach aimed at examining the tactics employed by the parties in specific criminal proceedings. Analysis of materials from high-profile cases in Ukraine: The case of former Minister of Ecology Mykola Zlochevsky[6], The case of the Krayan plant[7], Case No. 521/17260/18[8], Case No. 991/1692/24[9], The case of former Supreme Court Chairman Vsevolod Knyazev[10], the "Ukrzaliznytsia" case (National Anti-Corruption Bureau of Ukraine, 2025), was conducted to verify the effectiveness of tactical approaches such as simulation of the crime scene, procedural isolation and financial neutralisation. The study of US case law in the cases of United States v. Samuel Bankman-Fried[11] and Operator of "Bitcoin Fog" (2024) was conducted to examine mechanisms for neutralising pressure on witnesses and legalising evidence from the digital

[1] Criminal Procedural Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.
[2] U.S. Code: Title 18 – Crimes and Criminal Procedure. (1948, June). Retrieved from https://www.law.cornell.edu/uscode/text/18.
[3] German Criminal Code. (1998, November). Retrieved from https://www.gesetze-im-internet.de/englisch_stgb/englisch_stgb.html.
[4] Criminal Code of Ukraine. (2001, April). Retrieved from https://zakon.rada.gov.ua/laws/show/2341-14#Text.
[5] Criminal Procedural Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.
[6] The case of former Minister of Ecology Mykola Zlochevsky. (2022, May). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52020000000000473.
[7] The case of the Krayan plant. (2021, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52016000000000411.
[8] Case No. 521/17260/18. (2019, July). Retrieved from https://clarity-project.info/court/decision/82973002.
[9] Case No. 991/1692/24. (2025, November). Retrieved from https://reyestr.court.gov.ua/Review/131931145.
[10] The case of former Supreme Court Chairman Vsevolod Knyazev. (2024, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52023000000000202.
[11] United States v. Samuel Bankman-Fried, a/k/a "SBF," 22 Cr. 673 (LAK). (2024, March). Retrieved from https://www.justice.gov/usao-sdny/united-states-v-samuel-bankman-fried-aka-sbf-22-cr-673-lak.

reconstruction of transactions. At the same time, an analysis of German court decisions in the cases of EncroChat[1], Wirecard (Bushuev, 2022) and Tandler (Ott, 2023) were conducted to substantiate the admissibility of evidence.

The fourth stage used the comparative law method to identify ways of improving national legislation. Analysis of US legislation: U.S. Code: Title 18 – Crimes and Criminal Procedure[2]; Foreign Corrupt Practices Act of 1977[3]; 9-47.120 – FCPA Corporate Enforcement Policy[4] and West Germany: The German Criminal Code[5] and the German Code of Criminal Procedure[6] were examined to identify the most appropriate wording for provisions concerning liability for obstruction of justice. A study of European directives: Directive (EU) No. 2019/1937 of the European Parliament and of the Council "On the Protection of Persons Who Report Breaches of Union Law"[7], the Act for the Better Protection of Whistleblowers[8] The recommendations of the United Nations Office on Drugs and Crime (2025) were conducted to develop algorithms for the protection of whistleblowers. A limitation of the study is the use exclusively of open data from court registers and official reports from law enforcement agencies.

Results

A doctrinal distinction between the concepts of "overcoming" and "neutralisation". The effectiveness of pre-trial investigations into criminal offences in the sphere of official duties is directly linked to the prosecution's ability to identify, anticipate and counteract the evasive tactics employed by the perpetrators. In legal doctrine and law enforcement practice, the terms "overcoming" and "neutralisation" are used to describe the response of authorised persons to the destructive influence of suspects, and these terms are often mistakenly equated. However, a semantic and logical-legal analysis, conducted through the prism of the specific nature of "white-collar" crime, has revealed a significant substantive difference between these concepts (Table 1).

Table 1. A comparative analysis of the tactical and legal nature of the concepts of "overcoming" and "neutralising" obstruction of an investigation

Comparison criteria	Overcoming	Neutralisation
Direction of action	Retrospective (a reaction to the past)	Proactive/preventive (a pre-emptive action)
Tactic description	Breaking through an established barrier, overcoming active resistance	Neutralising the opposing force, rendering the threat harmless before any consequences arise
Nature of the countermeasures	Physical destruction of evidence, falsification of documents, refusal to testify	Misuse of administrative resources, digital obfuscation, and preparation for data destruction
Form of conflict	Open confrontation (search met with resistance, interrogation)	Covert/hidden struggle (NS(R)D, account freezing)
Key tools	Forensic investigations (data recovery), further questioning, and temporary access	Suspension from office, freezing of assets, infiltration by undercover agents, and digitisation of the process in the form of "iCase"
The psychological effect	Overcoming the suspect's resistance	Creating conditions under which resistance becomes technically or legally impossible

Source: compiled by the author based on the German Criminal Code[9], U.S. Code: Title 18 – Crimes and Criminal Procedure[10], Criminal Procedural Code of Ukraine[11], M.S. Tsutskiridze (2020)

[1] CaseC-670/22, M.N. (EncroChat): Judgment of the Court (Grand Chamber) (request for a preliminary ruling from the Landgericht Berlin – Germany) – Criminal proceedings against M.N. (Reference for a preliminary ruling – Judicial cooperation in criminal matters – Directive 2014/41/EU – European Investigation Order (EIO) in criminal matters – Obtaining of evidence already in the possession of the competent authorities of the executing State – Conditions for issuing an EIO – Encrypted telecommunications service – EncroChat – Need for the decision of a judge – Use of evidence obtained in breach of EU law). (2024, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62022CA0670.

[2] U.S. Code: Title 18 – Crimes and Criminal Procedure. (1948, June). Retrieved from https://www.law.cornell.edu/uscode/text/18.

[3] Foreign Corrupt Practices Act of 1977. (1977, December). Retrieved from https://www.govinfo.gov/content/pkg/COMPS-9569/pdf/COMPS-9569.pdf.

[4] 9-47.120 – FCPA Corporate Enforcement Policy. (2019, March). Retrieved from https://www.justice.gov/criminal/criminal-fraud/file/838416/dl.

[5] German Criminal Code. (1998, November). Retrieved from https://www.gesetze-im-internet.de/englisch_stgb/englisch_stgb.html.

[6] German Code of Criminal Procedure. (1987, April). Retrieved from https://www.gesetze-im-internet.de/englisch_stpo/englisch_stpo.html.

[7] Directive (EU) No. 2019/1937 of the European Parliament and of the Council "On the Protection of Persons Who Report Breaches of Union Law". (2019, October). Retrieved from https://eur-lex.europa.eu/eli/dir/2019/1937/oj/eng.

[8] Act for the Better Protection of Whistleblowers. (2023, May). Retrieved from https://www.gesetze-im-internet.de/englisch_hinschg/englisch_hinschg.html.

[9] German Criminal Code. (1998, November). Retrieved from https://www.gesetze-im-internet.de/englisch_stgb/englisch_stgb.html.

[10] U.S. Code: Title 18 – Crimes and Criminal Procedure. (1948, June). Retrieved from https://www.law.cornell.edu/uscode/text/18.

[11] Criminal Procedural Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.

As noted by M.S. Tsutskiridze (2020), an investigator's criminal procedural activities in a context of conflict require a determination of the nature of the obstacles that arise during the presentation of evidence. The application of the semantic method has established that the term "overcoming" is etymologically linked to passing through an existing obstacle or achieving victory overactive resistance. From a criminalistic perspective, overcoming activities are predominantly retrospective in nature, as the investigator is compelled to react to an act of obstruction that has already taken place. The legal basis for classifying such actions is provided by the Criminal Code of Ukraine.[1], in particular Article 358 (Forgery of documents, seals, stamps and forms) and Article 366 (Official forgery). A specific example of such a situation in proceedings concerning the misappropriation of budget funds (Article 191 of the Criminal Code of Ukraine) is the case of embezzlement within the structure of "Ukroboronprom", where officials of the state-owned enterprise paid 146 million UAH for fictitious "agency services" relating to the sale of military equipment. In this case, the source documentation was falsified: contracts and service provision certificates were drawn up in the names of foreign front companies, although in reality, all the efforts were made by the state-owned enterprise's staff. In this case, the investigator's strategy aims to recover lost information by obtaining temporary access to items and documents, and commissioning forensic economic and handwriting analyses, which essentially constitutes a process of "overcoming" an already established barrier24. Economic expert reports and the analysis of financial flows established that the "agency agreements" had no real substance, and that the transferred funds were subsequently distributed among the members of the criminal group. Another example of retrospective counteraction is the giving of false testimony by subordinate employees under pressure from management. In cases of official misconduct, the heads of an institution may exploit the administrative dependence of staff by threatening dismissal or disciplinary action. A specific example of such tactics is an organised group uncovered in the Odesa region, which operated directly within the judicial system to organise schemes for the illegal departure of conscripts abroad. Under this scheme, court decisions were issued on fabricated grounds, granting a father sole custody of a child, thereby creating fictitious legal grounds for crossing the border. The internal hierarchy and the involvement of staff disguised the unlawful activities as legitimate judicial proceedings. According to analytical reports by the National Anti-Corruption Bureau of Ukraine, individuals under investigation (senior officials and heads of state-owned enterprises) use corporate resources and messaging apps (Signal, WhatsApp) to brief witnesses and coordinate defence strategies even before the first summons for questioning (National Anti-Corruption Bureau of Ukraine, 2024; 2025). In such a situation, the investigator faces an already established obstacle, which must be overcome by conducting simultaneous interrogations and using data obtained as a result of covert investigative (search) operations (C(S)O). To verify the intensity of resistance and assess the effectiveness of measures to counter it, statistical indicators were analysed (Table 2).

Table 2. Statistics on persons who have committed criminal offences in the course of their official duties (2022-2025)

	2022	**2023**	**2024**	**2025**
Total number of persons informed of suspicion	85.285	108.271	108.387	93.139
Total number of individuals informed of suspicion of crime in the sphere of official duties	4.808	5.916	7.570	7.394
% of the total number of persons informed of suspicion	5.6%	4.8%	7%	8%
The number of individuals who have committed offences in the course of their duties and in respect of whom a special pre-trial investigation has been conducted	3	7	13	3
The number of persons who committed offences in the course of their duties and in respect of whom criminal proceedings were closed on exonerating grounds	2	5	1	0
The number of persons who committed offences in the course of their official duties and in respect of whom criminal proceedings have been discontinued pursuant to paragraph 10 of Part 1 of Article 284 of the Code of Criminal Procedure of Ukraine	0	0	0	0
The number of persons subject to pre-trial detention as a preventive measure for committing offences in the course of their duties	43	62	78	121

Source: compiled by the author based on Office of the Attorney General (n.d.)

An analysis of the data in Table 2 confirmed a shift in the focus of investigations towards proactive prevention. Firstly, despite general fluctuations in the number of suspects, the segment of white-collar crime showed steady growth – from 4,808 individuals in 2022 to 7,394 in 2025 (an increase of 53.8%).

[1] Criminal Code of Ukraine. (2001, April). Retrieved from https://zakon.rada.gov.ua/laws/show/2341-14#Text.

Secondly, the most significant development is the almost threefold increase in the number of cases where pre-trial detention was applied (from 43 to 121 individuals). This trend is a direct tactical response to attempts by suspects to use their status to exert pressure: the investigation is increasingly opting for the complete isolation of the suspect as a means of neutralising their influence. Thirdly, the zero figure for cases closed on rehabilitative grounds in 2025 demonstrates that the use of stringent neutralisation measures (such as pre-trial detention) is accompanied by an improvement in the quality of the evidence base. Even with a decrease in the number of special investigations (*in absentia*), this indicates not a decline in activity, but a more effective neutralisation of the risk of flight at the initial stage. This approach correlates with the high effectiveness of anti-corruption bodies, in particular the National Anti-Corruption Bureau of Ukraine (2025), during the reporting period of 2025, the economic impact of whose activities exceeded UAH 16.8 billion, representing the amount of restitution for high-level corruption offences.

In contrast, the category of "neutralisation" has a broader tactical scope, particularly concerning individuals vested with authority. Semantically, this term refers to counterbalancing opposing forces or rendering a threat harmless before irreversible consequences arise. In the case of official crimes, where perpetrators possess administrative resources and knowledge of investigative methods, neutralisation – which encompasses preventive measures – is the priority. The implemented strategy for the digital transformation of criminal justice has shifted the main focus of countering resistance to the cyber domain, where the priority task has become ensuring the integrity of electronic data sets and pre-emptively halting high-tech attempts to compromise investigative operations. It involves preventive blocking of access to electronic evidence (cloud storage, servers, corporate email) until such time as it is remotely destroyed by the suspects (Puddister & McNabb, 2021; Stepaniuk, 2025). Neutralisation is aimed at blocking the very possibility of using one's official position to obstruct the investigation. A classic procedural tool for neutralisation is the suspension of an official from office in accordance with Article 154 of the Criminal Procedure Code of Ukraine[1]. This measure severs the administrative link between the suspect manager and potential subordinate witnesses, depriving the subject of the countermeasure of their means of influence. An analysis of how the courts apply these categories in the context of actual resistance confirms the validity of proactive tactics. A three-tier model for overcoming resistance was applied in the case of the former head of the Supreme Court. At the first stage, the defendant's multi-layered defence system, which included the use of a "back office" and secure communication channels, was neutralised by a combination of undercover infiltration (cooperation with a notary acting as an intermediary) and technical surveillance, which made it possible to record the receipt of 2.7 million USD directly in the defendant's office. In the second stage, the chosen tactics were legally validated in court. Attempts by the defence to discredit the evidence through claims of "provocation of a crime" were rejected by the Appeals Chamber of the High Anti-Corruption Court (HACC), which effectively recognised the agent's active conduct within the closed environment of the criminal group as a permissible means of documentation[2,3]. The final institutional neutralisation in this case was achieved through administrative proceedings for property-related offences, the judge's dismissal from office, and the conclusion of a plea agreement with an accomplice, which broke the chain of mutual support and finally deprived the defendant of administrative resources.

Another example is Case No. 991/1297/22[4]. In Ukrainian judicial practice, this case has become a model of how to comprehensively counter multi-layered resistance; an analysis of it has made it possible to trace the evolution of the parties' tactics from active resistance to procedural compromise. At the initial stage, an attempt to bribe the leadership of the anti-corruption authorities with a record bribe of 6 million USD was neutralised by the prosecution using tactics to simulate the circumstances of the crime, which made it possible to document the chain of intermediaries and apprehend them in the act. Subsequently, during the trial phase, the defence resorted to legal sabotage, securing the return of the indictment on the grounds of an allegedly forged prosecutor's signature (ruling of the High Anti-Corruption Court of 19 October 2022[5], however, this form of legal obstruction was swiftly neutralised by judicial review, when the Appeals Chamber of the HACC overturned the unfounded ruling and resumed proceedings. The final act of the confrontation was a plea bargain, used to counter the tactics of evading

[1] Criminal Procedural Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.
[2] The case of former Supreme Court Chairman Vsevolod Knyazev. (2024, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52023000000000202.
[3] Case No. 991/1692/24. (2025, November). Retrieved from https://reyestr.court.gov.ua/Review/131931145.
[4] The case of former Minister of Ecology Mykola Zlochevsky. (2022, May). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52020000000000473.
[5] Ibidem, 2022.

justice while the defendant was abroad. The investigation utilised proceedings *in absentia*, followed by a reclassification of the charges, which culminated in the approval of a plea agreement and the financial neutralisation of the consequences of the offence in the form of voluntary compensation for defence costs amounting to over UAH 660 million. In this case, the allocation of funds intended for corruption to defence needs during wartime was deemed a higher tactical priority than the protracted effort to overcome procedural obstruction by the defence.

The experience of the United States of America and the Federal Republic of Germany has shown that the effective neutralisation of obstruction is based on legislative provisions establishing liability for the very act of obstruction, even in the absence of serious consequences. Thus, in the US legal system, the offence of Obstruction of Justice, codified in the US Code: Title 18 – Crimes and Criminal Procedure[1], serves as a tool for neutralisation. In particular, Section 1512 provides for liability for "Tampering with a witness, victim, or an informant". The American model of tactics is based on the presumption that any attempt to exert pressure on participants in the proceedings constitutes a separate serious offence. This neutralises obstruction in the US by initiating parallel criminal proceedings for the act of obstruction, even before the investigation into the main official offence has been completed. Such tactics create a "self-neutralising" effect. In other words, the risk of receiving a lengthy prison sentence for pressuring a witness may outweigh the benefit of concealing the main offence. In Germany (FRG), Section 258 of the German Criminal Code[2] establishes liability for obstruction of justice (Strafvereitelung). German doctrine on the investigation of official offences (Amtsdelikte) emphasises the tactic of "sudden freezing of assets and data". According to German practice, neutralising obstruction is achieved through synchronised searches (Durchsuchung) of offices and private premises, which prevents accomplices from coordinating their actions (European Union Agency for Criminal Justice Cooperation, 2024). Crucially, German legislation clearly distinguishes between the passive right to defence and active obstruction of the investigation. In particular, the German Criminal Code criminalises actions aimed at creating fabricated evidence and manipulating information, classifying them under paragraph 258 (Obstruction of Justice), as well as 267 (Falsification of Documents) and 269 (Falsification of Evidence). This approach makes it possible for German law enforcement agencies to hold officials accountable not only for the main corruption offence, but also separately for each attempt to falsify digital or paper-based information carriers.

An analysis of law enforcement practice, as reflected in the National Anti-Corruption Bureau of Ukraine's Report (2025) for the first half of 2025, indicates that the effectiveness of investigations depends on the speed of response to information leaks and the use of the latest digital tools, in particular the "iCase" electronic criminal proceedings system, software tools for monitoring unauthorised access to state registers, and tools for conducting complex cross-border financial investigations. As noted in the report, one of the most dangerous forms of counteraction has been the use by suspects of insider information to conceal evidence even before the active phase of implementation begins. The report's empirical data highlights the scale of such information-based countermeasures: investigators uncovered a scheme involving unauthorised monitoring of the restricted section of the Unified State Register of Court Decisions, through which the perpetrators conducted 39,615 search queries and viewed 7,572 rulings by investigating judges. Access to this data made it possible for the defence to stay one step ahead of law enforcement, warning clients of planned searches and seizures of property, which created conditions for the destruction of material evidence and the concealment of assets. In this regard, it is appropriate to view neutralisation as a comprehensive two-tier system. The first level – procedural neutralisation – involves the use of non-discretionary measures to secure criminal proceedings to prevent losses. A notable example of the effectiveness of such tactics is the case concerning land fraud at the Ministry of Community, Territorial and Infrastructure Development, where, thanks to the timely seizure of the plot, it was possible to prevent (neutralise) losses to the state amounting to 1 billion UAH as early as the pre-trial investigation stage. The second level – tactical and forensic neutralisation – is based on technological superiority and the element of surprise. In circumstances where physical document flow is vulnerable to destruction, the digitisation of the process becomes a strategic tool for neutralisation. The implementation of the "iCase" electronic criminal proceedings system, in which over 1,800 cases have already been registered, minimises the risks of physical loss of materials and ensures that traces of the crime are recorded in a digital environment inaccessible to manipulation by the corrupt networks of those involved. Furthermore, tactical neutralisation is effectively used to expose shadow management structures ("back offices"), as was the case in the "Ukrzaliznytsia" case, where NABU identified and neutralised a parallel structure that,

[1] U.S. Code: Title 18 – Crimes and Criminal Procedure. (1948, June). Retrieved from https://www.law.cornell.edu/uscode/text/18.
[2] German Criminal Code. (1998, November). Retrieved from https://www.gesetze-im-internet.de/englisch_stgb/englisch_stgb.html.

for a certain percentage, ensured victory in tenders for companies under its control. Another key aspect in distinguishing between the concepts under consideration is the psychological component of the tactics. Whilst "overcoming" involves open conflict (for example, during searches where instances of physical resistance and pressure on detectives are recorded), "neutralisation" is conducted covertly. An example is remote monitoring and analysis of digital data, which renders suspects' attempts to destroy paper "slush fund" records meaningless. Thus, the transition from reactive "overcoming" to proactive "neutralisation", underpinned by an economic benefit of UAH 16.8 billion, is the only viable direction for the development of methods for investigating official crimes.

A strategy for countering institutional and external obstruction of investigations into corruption offences. Whilst at the tactical level, obstruction of investigations involves the destruction of evidence or the influencing of witnesses, at the strategic level it takes the form of institutional resistance, which poses a far greater threat to the criminal justice system. A systematic analysis of the empirical data contained in the reports of the National Anti-Corruption Bureau of Ukraine (2024; 2025) for 2024-2025 has revealed that holders of public authority are increasingly resorting to mechanisms of external interference to deprive pre-trial investigation bodies of their functional capacity. In such circumstances, the tactics of neutralisation extend outside the criminal process and become part of a comprehensive strategy to safeguard institutional independence. Empirical evidence of the effectiveness of mobilising civil society as a tool for neutralising institutional threats is provided by a precedent documented in the Report of the National Anti-Corruption Bureau of Ukraine for the first half of 2025. During this period, anti-corruption bodies faced legislative pressure for the first time when the legislature adopted a regulatory act (Official statement of NABU…, 2025) that effectively restricted the administrative autonomy of NABU and the SAPO, and this decision was taken without discussion and contrary to the consolidated position of civil society and international partners (Patrikeeva, 2025). However, as noted in the report, the immediate reaction of the public, which sparked a significant "public outcry", proved to be the decisive factor in tactically neutralising this threat. The result of this coordinated response from the civil sector was that the legislature was subsequently forced to pass a new law, which, de jure and de facto, restored the independence of anti-corruption institutions (National Anti-Corruption Bureau of Ukraine, 2025). This case demonstrated that, in conditions of political instability, it is precisely publicity and the support of external stakeholders that act as a safeguard against attempts to dismantle the anti-corruption infrastructure. This confirmed the thesis that, in cases involving high-level official misconduct, neutralising political interference is a necessary prerequisite for initiating legal proceedings. Judicial practice confirms the possibility of neutralising "regional judicial protectionism" through mechanisms of judicial review. In the proceedings concerning the Mayor of Odesa (the "Krayan" factory case and the land acquisition scheme)[1], the systematic obstruction, manifested in the acquittal of the defendants by the court of first instance, was neutralised by the Appeals Chamber of the HACC, which overturned the questionable verdict. The new phase of curbing the use of administrative resources in 2025 was characterised by a combination of procedural measures (raising the bail amount to UAH 42 million) and extraordinary administrative measures, including the revocation of citizenship. This steps *de jure* removed the individual from positions of authority, definitively eliminating the risks of their using their office to put pressure on witnesses and obstruct the investigation.

A distinct and dangerous form of opposition identified in 2025 was the direct physical and procedural pressure exerted on law enforcement officers (National Anti-Corruption Bureau of Ukraine, 2025). The report documents instances of searches being conducted on NABU staff without the requisite court orders, as well as the use of physical force and unlawful surveillance against them. Such actions aim to psychologically destabilise personnel and intimidate investigators. The strategy for countering this involves the strict application of the legal safeguards provided for in the relevant legislation. The key instrument is the procedural recording of each instance of pressure as a separate criminal offence (interference in the activities of a law enforcement officer) and the provision of personal security for staff by special units. A significant problem that complicates investigations and creates conditions for information leaks is the technical dependence of anti-corruption bodies. According to the Report of the National Anti-Corruption Bureau of Ukraine (2024) for the first half of 2024, NABU still lacks the legal authority to autonomously obtain information from telecommunications networks, forcing it to rely on the resources of the Security Service of Ukraine. Such dependence creates risks of compromising covert investigative (surveillance) operations even at the planning stage. At this stage, a tactical approach to mitigating this vulnerability involves using alternative methods to obtain digital evidence (for example, accessing correspondence via seized physical devices rather than through traffic interception);

[1] The case of the Krayan plant. (2021, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52016000000000411.

however, a strategic solution to the problem is only possible through legislative changes aimed at breaking the monopoly on "wiretapping". Furthermore, the lack of an independent expert body forces NABU investigators to turn to institutions subordinate to other agencies, which also creates risks of delays in conducting expert examinations as a form of procedural obstruction. A key element of the tactic to neutralise organised opposition, which is often characterised by a code of silence ("omerta") within state institutions, is the development of the institution of whistleblowers. This approach is also being implemented in Ukraine: according to a report by the National Anti-Corruption Bureau of Ukraine (2025), based on an audit by the United Nations Office on Drugs and Crime (UNODC) (2025), new anonymity protocols are being introduced to minimise risks to whistle-blowers. In this context, the experience of Germany is instructive, where in July 2023, the Act for the Better Protection of Whistleblowers[1] was enacted, implementing Directive (EU) No. 2019/1937 of the European Parliament and of the Council[2]. The German model of neutralisation is based on the mandatory establishment of secure internal reporting channels in all organisations with more than 50 employees. This can be used by law enforcement agencies to obtain evidence against corporate executives or government officials directly from within the system, thereby undermining corporate solidarity[3]. In Ukraine, this approach is also gradually gaining ground, but requires improvements to the mechanisms for the physical protection and financial incentives for whistleblowers to enhance the effectiveness of uncovering hidden crimes.

A body of case law has developed in Ukrainian and international judicial practice that recognises various forms of neutralisation depending on the type of threat (Table 3).

Table 3. Systematisation of tactical methods for countering resistance based on an analysis of national and international case law (2022-2025)

Case/defendant (jurisdiction)	Type of countermeasure detected	The neutralisation tactics employed	Result/legal consequence
The case of former Minister of Ecology Mykola Zlochevsky[4] No. 991/1297/22 (Ukraine, HACC) – Article 27(3) and Article 369(4) of the Criminal Code of Ukraine	Attempted bribery (USD 6 million), obstruction of justice (forgery of a signature), evasion of investigation	Reconstruction of the crime scene; *In absentia*; Plea bargaining	Financial neutralisation: UAH 660 million for the Armed Forces of Ukraine, a fine, a non-custodial sentence
The case of the Krayan plant[5] involving G.L. Trukhanov, former mayor of Odessa, and others. No. 521/17260/18, 991/2550/22, 991/3016/23 (Ukraine, HACC) – Article 191(5), Article 364(2), Article 368(4), Article 369(3), Article 206-2(3) and Article 209(3) of the Criminal Code of Ukraine	Regional judicial protectionism, use of administrative resources to exert pressure	Appeal proceedings; increase in bail; deprivation of citizenship	Administrative neutralisation: removal from office, elimination of means of influence
The case of former Supreme Court Chairman Vsevolod Knyazev[6], No. 991/1692/24[7], 2024 (Ukraine, HACC) – Article 368(4) of the Criminal Code of Ukraine	Conspiracy ("backroom dealings"), discrediting the NS(R)D ("provocation")	Undercover infiltration; technical surveillance; parallel administrative pressure	Institutional neutralisation: dismissal from office, judicial validation of the agent's actions
U.S. v. Bankman-Fried[8] (USA)	Witness Tampering (pressure via the media), use of Signal/VPN	Complete isolation: revocation of bail, detention pending trial	Prevention of information leaks and influence on witnesses
U.S. v. Sterlingov/Bitcoin Fog (USA)	Technical obfuscation, use of mixers	Digital de-anonymisation: blockchain analysis, transaction reconstruction	The admissibility of heuristic analysis as evidence; a conviction.

[1] Act for the Better Protection of Whistleblowers. (2023, May). Retrieved from https://www.gesetze-im-internet.de/englisch_hinschg/englisch_hinschg.html.
[2] Directive (EU) No. 2019/1937 of the European Parliament and of the Council "On the Protection of Persons Who Report Breaches of Union Law". (2019, October). Retrieved from https://eur-lex.europa.eu/eli/dir/2019/1937/oj/eng.
[3] Act for the Better Protection of Whistleblowers. (2023, May). Retrieved from https://www.gesetze-im-internet.de/englisch_hinschg/englisch_hinschg.html.
[4] The case of former Minister of Ecology Mykola Zlochevsky. (2022, May). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52020000000000473.
[5] The case of the Krayan plant. (2021, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52016000000000411.
[6] The case of former Supreme Court Chairman Vsevolod Knyazev. (2024, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52023000000000202.
[7] Case No. 991/1692/24. (2025, November). Retrieved from https://reyestr.court.gov.ua/Review/131931145
[8] United States v. Samuel Bankman-Fried, a/k/a "SBF," 22 Cr. 673 (LAK). (2024, March). Retrieved from https://www.justice.gov/usao-sdny/united-states-v-samuel-bankman-fried-aka-sbf-22-cr-673-lak.

Table 3. Continued

Case/defendant (jurisdiction)	Type of countermeasure detected	The neutralisation tactics employed	Result/legal consequence
The EncroChat case[1] (Germany, Federal Court of Justice)	Use of cryptophones ("dark-tech"), end-to-end encryption	Mass digital interception: hacking of servers by a foreign intelligence service	Precedent regarding the admissibility of evidence obtained through a mass data breach
The Tandler case (Germany, Munich Regional Court I)	Offshore schemes, disguising bribes as consultancy fees	Fiscal neutralisation: Verständigung (settlement) with full forfeiture	"Economic sterilisation": confiscation of EUR 7.8 million in assets
The Wirecard case (Germany)	Complex offshore transactions, the risk of capital flight prior to sentencing	Pre-emptive asset seizure: "Extended confiscation" of management assets	Blocking attempts to withdraw funds, ensuring compensation for losses

Source: compiled by the author based on M. Bushuev (2022), K. Ott (2023), Operator of "Bitcoin Fog" sentenced to more than 12 years in prison for running notorious Darknet cryptocurrency mixer (2024)

International practice, in turn, demonstrates a rigorous strategy for responding procedurally to information warfare. In the case of United States v. Samuel Bankman-Fried[2], the court neutralised "Witness Tampering" (leaks of the witness's diaries to the media and via Signal) by revoking bail and placing the defendant in complete isolation, recognising the use of VPNs and encrypted chats as a form of obstruction of justice. As for digital evidence, courts are legalising methods of "digital de-anonymisation". In the Bitcoin Fog case (Operator of "Bitcoin Fog"…, 2024), the admissibility of heuristic blockchain analysis to overcome trace obfuscation technologies was recognised, and in the EncroChat[3] case, the German Federal Court confirmed the lawfulness of mass data interception, emphasising the primacy of the interests of justice over the confidentiality of "dark-tech" correspondence. Furthermore, the neutralisation strategy encompasses the property aspect. In the Wirecard case (Bushuev, 2022), the preventive seizure of assets through "extended confiscation" was legitimised to prevent their transfer to offshore accounts, and in the Andrea Tandler case (Ott, 2023), the concept of "economic sterilisation" of the offence was implemented, which entails the complete deprivation of the defendant's benefits from corrupt ties as a mandatory condition of the plea bargain.

An analysis of case law across three jurisdictions shows that courts tend to side with the prosecution regarding the application of intensive procedural measures (server hacking, revocation of bail, freezing of assets pending sentencing) if the investigation demonstrates that the countermeasures are organised and high-tech in nature. Case law serves not only as a filter for the admissibility of evidence but also as an indicator of the evolution of neutralisation tactics, which are shifting from forceful confrontation to intellectual and technological struggle and procedural compromises (Porter, 2021; Bushuev, 2022; Ott, 2023).

A comparative analysis of tactics for countering obstruction in the field of transnational financial investigations has highlighted the advisability of implementing US approaches. The practice of the US Department of Justice (DOJ) regarding the application of the Foreign Corrupt Practices Act of 1977 (FCPA)[4] is based on a "coercion to cooperate" tactic through a policy of corporate enforcement[5]. The American strategy consists of creating conditions under which

[1] CaseC-670/22, M.N. (EncroChat): Judgment of the Court (Grand Chamber) (request for a preliminary ruling from the Landgericht Berlin – Germany) – Criminal proceedings against M.N. (Reference for a preliminary ruling – Judicial cooperation in criminal matters – Directive 2014/41/EU – European Investigation Order (EIO) in criminal matters – Obtaining of evidence already in the possession of the competent authorities of the executing State – Conditions for issuing an EIO – Encrypted telecommunications service – EncroChat – Need for the decision of a judge – Use of evidence obtained in breach of EU law). (2024, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62022CA0670.

[2] United States v. Samuel Bankman-Fried, a/k/a "SBF," 22 Cr. 673 (LAK). (2024, March). Retrieved from https://www.justice.gov/usao-sdny/united-states-v-samuel-bankman-fried-aka-sbf-22-cr-673-lak.

[3] CaseC-670/22, M.N. (EncroChat): Judgment of the Court (Grand Chamber) (request for a preliminary ruling from the Landgericht Berlin – Germany) – Criminal proceedings against M.N. (Reference for a preliminary ruling – Judicial cooperation in criminal matters – Directive 2014/41/EU – European Investigation Order (EIO) in criminal matters – Obtaining of evidence already in the possession of the competent authorities of the executing State – Conditions for issuing an EIO – Encrypted telecommunications service – EncroChat – Need for the decision of a judge – Use of evidence obtained in breach of EU law). (2024, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62022CA0670.

[4] Foreign Corrupt Practices Act of 1977. (1977, December). Retrieved from https://www.govinfo.gov/content/pkg/COMPS-9569/pdf/COMPS-9569.pdf.

[5] 9-47.120 – FCPA Corporate Enforcement Policy. (2019, March). Retrieved from https://www.justice.gov/criminal/criminal-fraud/file/838416/dl.

it is more advantageous for corporations to conduct an internal investigation themselves, identify the guilty parties and disclose the scheme to law enforcement agencies, rather than face the risk of criminal prosecution and fines. This tactic effectively shifts the burden of gathering evidence onto the legal entity, neutralising its resistance and turning a potential adversary into a source of evidence. For Ukraine, adapting this approach through the institution of plea agreements is a promising way to overcome resistance in cases involving complex financial schemes and large business structures. Tactics for neutralising attempts to discredit investigation findings through external oversight mechanisms were also analysed. The 2024 Report of the National Anti-Corruption Bureau of Ukraine (NABU) emphasises that conducting an independent audit of NABU's activities is a complex task that often becomes the subject of political manipulation. Opponents attempt to use audit procedures to gain access to confidential case materials or to obstruct the agency's work. Effective neutrality in this regard requires the inclusion of recognised international experts on the committees, whose reputation acts as a safeguard against politically motivated conclusions.

Based on the study of tactics used to counteract obstruction of investigations into official crimes, recommendations have been formulated for improving law enforcement and judicial activities in Ukraine, which are grounded in the modelling of effective institutional and tactical solutions tested in international practice. One of the key problems with the current legal framework in Ukraine is the lack of full technical autonomy for anti-corruption bodies in the conduct of covert investigative (surveillance) operations. In particular, the NABU cannot intercept information from telecommunications networks and is forced to involve other law enforcement agencies, which creates institutional risks of information leaks and the exposure of covert investigative operations. In contrast, under the legal systems of the US and Germany, specialised pre-trial investigation bodies possess full operational autonomy and internal technical capabilities for intercepting information, subject to strict judicial oversight and internal audit, which minimises the risks of external interference. Although Part 4 of Article 263 of the Criminal Procedure Code of Ukraine[1] already grants authorised units of the NABU the right to independently intercept information from transport telecommunications networks, the actual implementation of this provision is still hampered by the lack of autonomous technical infrastructure and independent connection channels to telecommunications operators. In this regard, the priority is to ensure the NABU's full technical independence by deploying internal equipment to provide direct access to telecommunications networks without the involvement of other law enforcement agencies. Implementing such a model will eliminate the bureau's institutional dependence, neutralise the risks of leaks of official information during the technical preparation of covert investigative operations, and ensure genuine confidentiality of investigations into high-level corruption even before they enter the active phase.

The primary focus of countering such interference is to ensure the security of criminal proceedings materials. In Ukraine, traditional methods of storing case materials leave room for their physical destruction or falsification. In contrast, European Union member states actively utilise digital criminal proceedings management systems based on the principles of data immutability and full traceability of access. In this regard, it is advisable to further scale up the "iCase" electronic criminal proceedings system, the legal foundation of which is already enshrined in Article 106-1 of the Criminal Procedure Code of Ukraine[2], which should become a priority in ensuring the technological level of countering obstruction. The full integration of this system into anti-corruption investigations guarantees the absolute inviolability of case materials. Thanks to the digital recording of every procedural action in real time, the risks of physical destruction, unauthorised removal or falsification of evidence are effectively eliminated, ensuring the integrity of the evidence base until it is presented to the court. The development of the institution of whistleblowers as a tool for internal neutralisation of countermeasures deserves particular attention. In Ukraine, mechanisms for the protection of whistleblowers remain insufficiently effective, which hinders the flow of information from within state bodies. In contrast, European Union countries are introducing secure internal reporting channels that guarantee anonymity and legal protection for individuals reporting corruption offences[3] (National Anti-Corruption Bureau of Ukraine, 2025). The introduction and proper functioning of such channels in Ukraine will help break down corporate solidarity within state bodies and ensure that evidence is obtained directly from within criminal schemes. In cases involving transnational corruption, it is advisable to make more active use of financial neutralisation tactics. In Ukraine, investigations often focus

[1] Criminal Procedural Code of Ukraine. (2012, April). Retrieved from https://zakon.rada.gov.ua/laws/show/4651-17#Text.
[2] Ibidem, 2012.
[3] Act for the Better Protection of Whistleblowers. (2023, May). Retrieved from https://www.gesetze-im-internet.de/englisch_hinschg/englisch_hinschg.html.

on protracted procedural battles, whereas in US law enforcement practice, plea agreements with a focus on asset forfeiture and compensation for damages caused is prioritised[1]. Adapting this approach to the Ukrainian context will reduce the resources available to suspects for resistance and deprive them of the financial basis for further obstruction of the investigation. At the tactical level, the neutralisation of digital conspiracy is of paramount importance. In Ukraine, there is still no established judicial position on the admissibility of evidence obtained through high-tech access to digital information. At the same time, judicial practice in the EU and the US recognises the admissibility of evidence obtained through the analysis of encrypted communications and blockchain transactions, as a response to criminals' use of "dark-tech" tools[2] (Operator of "Bitcoin Fog"…, 2024). The adoption of a similar approach – which involves recognising the legitimacy of data obtained through the authorised circumvention of the cryptographic protection of specialised messaging apps and the de-anonymisation of digital asset holders using digital forensics and the analysis of public blockchain ledgers – in Ukrainian judicial practice will help prevent the use of digital technologies as a tool to obstruct investigations. The implementation of the proposed recommendations ensures a shift from reactively addressing the consequences of obstruction to proactively neutralising the risks of obstruction of justice in the investigation of official crimes.

To summarise, it is possible to argue that modern tactics for countering obstruction of investigations into official misconduct constitute a multi-layered system. They are not limited to the procedural actions of the investigator at the scene of the incident, but encompass institutional safeguards, strategic communications and international cooperation. Empirical data confirm that successfully overcoming resistance from corrupt elites is only possible if the institutional independence of the pre-trial investigation body is preserved and effective legislative mechanisms are in place to provide physical and legal protection for its staff against external interference.

Discussion

The findings of the study confirmed that, in the context of modern high-tech and institutionally entrenched corruption, the traditional paradigm of "overcoming" obstacles (as a reactive response to barriers that have already been created) is losing its effectiveness. Instead, the strategy of "neutralisation" has become the only viable direction for the development of investigative methods; this involves the preventive elimination of threats – financial, administrative and informational – before they can be irreversibly realised. The data obtained on the evolution of tactics in court cases demonstrated a shift from forceful confrontation to an intellectual and technological struggle. This observation correlates with the findings of D. Rothe & D. Kauzlarich (2022), who emphasised that crimes committed by public officials remain largely invisible or are reclassified as errors precisely because of the elites' ability to manipulate social control. These findings expand upon this thesis by demonstrating that Ukrainian practice has developed mechanisms (in particular, the institution of *in absentia* proceedings and plea agreements) that make these crimes "visible" and punishable even when the accused have fled, effectively neutralising the strategy of "invisibility" described by American researchers.

A key aspect identified during the study was the tactical nature of resistance to the investigation. As noted by V. Jitariuc (2023), the process of investigating corruption offences is inevitably accompanied by active resistance from criminals and their associates, leading to numerous errors on the part of the investigating authorities. This study confirmed this view using the example of The case of the Krayan plant[3][4], where the prosecution's initial tactics proved ineffective due to manifestations of local judicial subjectivity. However, in contrast to the author's identification of the problem, the results of this study revealed the existence of effective solutions. In particular, the application of appellate review by the High Administrative Court and administrative measures (deprivation of citizenship) serves as an effective tool for neutralising such resistance. This is consistent with the position of R.M. Jacobs (2022), who, using the example of the Republic of South Africa (RSA), justified the need to transition to an intelligence-led approach. In this case, the analysis of Case No. 991/1692/24[5] (the use of a notary as an agent) illustrated the successful implementation of precisely such an intelligence-led approach, which made it possible to neutralise the

[1] U.S. Code: Title 18 – Crimes and Criminal Procedure. (1948, June). Retrieved from https://www.law.cornell.edu/uscode/text/18.
[2] CaseC-670/22, M.N. (EncroChat): Judgment of the Court (Grand Chamber) (request for a preliminary ruling from the Landgericht Berlin – Germany) – Criminal proceedings against M.N. (Reference for a preliminary ruling – Judicial cooperation in criminal matters – Directive 2014/41/EU – European Investigation Order (EIO) in criminal matters – Obtaining of evidence already in the possession of the competent authorities of the executing State – Conditions for issuing an EIO – Encrypted telecommunications service – EncroChat – Need for the decision of a judge – Use of evidence obtained in breach of EU law). (2024, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62022CA0670.
[3] The case of the Krayan plant. (2021, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52016000000000411.
[4] Case No. 521/17260/18. (2019, July). Retrieved from https://clarity-project.info/court/decision/82973002.
[5] Case No. 991/1692/24. (2025, November). Retrieved from https://reyestr.court.gov.ua/Review/131931145.

"back-office" conspiracy at the very planning stage of the crime.

The academic literature extensively discusses the neutralisation techniques employed by criminals themselves to justify their actions. In their study of interviews with convicted fraudsters, M. Hoekstra *et al.* (2026) identified techniques such as denial of responsibility and the condemnation of those who condemn them. Similar conclusions were reached by S. Lazarus *et al.* (2026) when analysing cyber fraudsters who justify their crimes by citing historical injustice. This study revealed a mirroring trend. Investigators' tactics regarding "neutralising resistance" are, in fact, a response to the "guilt neutralisation techniques" employed by criminals. For example, in case No. 991/1297/22[1], the defendants attempted to "buy" the closure of the case, rationalising this as a routine business transaction (denial of harm), however, the investigation, through financial neutralisation (channelling funds towards Ukraine's defence), dismantled this construct, transforming the bribery attempt into a resource for the state. This approach resonates with the study by H.N. Pontell *et al.* (2021), who described how the Trump administration used the technique of "normalising the condemnation of prosecutors" to combat investigations. The Ukrainian experience (the Trukhanov case[2] [3]) has shown that the best response to such political rhetoric is procedural decisions (increasing bail), which shift the conflict from the political to the legal sphere.

The institutional aspect of neutralising resistance, examined in this study through the lens of the activities of the NABU and the HACC, engages with the conclusions of K. Bolkvadze (2025). The author argued that in hybrid regimes, to which the author classifies Ukraine during the period 2013-2019, elites have strong incentives to maintain corruption within law enforcement agencies as a tool for survival. However, the findings regarding the dynamics of 2022-2025 refute this thesis for the current period. The rise in the number of suspicions and a threefold increase in cases of detention indicate a shift from a "corruption pyramid" to a model of actively neutralising elite resistance. This correlates with the position of J. Cifuentes-Faura (2025), who, using the example of the war in Ukraine, demonstrated that transparency and digitalisation significantly reduce information asymmetry and increase government accountability even in crisis conditions.

The comparative analysis conducted in this study has revealed profound parallels between Ukrainian practice and international standards. J. Lenz (2025), analysing the selective application of international law by Western states (the USA, Germany), noted that national interests often take precedence over international legal obligations. However, the results of this study point to a reverse trend in Ukraine: the implementation of *in absentia* proceedings and *plea bargaining* (as in Case No. 991/1297/22[4]) demonstrated the priority of substantive liability and the inevitability of punishment over political expediency. This confirms the view of Ž. Navickienė *et al.* (2025) state that the planning of investigations into modern financial crimes has evolved outside narrow algorithms and now requires complex international neutralisation schemes that extend to the level of joint investigation teams.

A separate area of discussion concerns the evidential value of neutralisation measures. V. Gribincea (2025) emphasised that, when investigating latent corruption offences, the court tends to rely more on the results of covert investigative (or intelligence-gathering) operations (C(I)O) than on witness testimony. The latter are presented in the form of digital forensic reports (for example, automated data extraction logs, traffic log files or big data analysis reports), which ensures a high level of objectivity and verifiability of the evidence base. This study has confirmed this trend: the neutralisation of the "digital alibi" through the hacking of messaging apps and blockchain analysis (as in the EncroChat[5] or Bitcoin Fog cases (Operator of "Bitcoin Fog"…, 2024)) is becoming the foundation of the prosecution. At the same time, the concept of neutralisation proposed in this work is theoretically justified by M.A. Nuryanta *et al.* (2025). The authors described a paradigm shift from "formal truth" to "material truth" in pre-trial proceedings. Whereas previously the investigation was limited to the formal removal of obstacles, as of 2025, active measures (preventive seizure of assets, restriction of the subjective rights of suspects through judicial oversight) are aimed at establishing the facts during the investigation.

[1] The case of former Supreme Court Chairman Vsevolod Knyazev. (2024, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52023000000000202.
[2] Case No. 521/17260/18. (2019, July). Retrieved from https://clarity-project.info/court/decision/82973002.
[3] The case of the Krayan plant. (2021, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52016000000000411.
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[5] CaseC-670/22, M.N. (EncroChat): Judgment of the Court (Grand Chamber) (request for a preliminary ruling from the Landgericht Berlin – Germany) – Criminal proceedings against M.N. (Reference for a preliminary ruling – Judicial cooperation in criminal matters – Directive 2014/41/EU – European Investigation Order (EIO) in criminal matters – Obtaining of evidence already in the possession of the competent authorities of the executing State – Conditions for issuing an EIO – Encrypted telecommunications service – EncroChat – Need for the decision of a judge – Use of evidence obtained in breach of EU law). (2024, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62022CA0670.

As regards the specific nature of white-collar crime, the findings of this study concerning the use of complex offshore schemes are fully consistent with the conclusions of T.A. Omang *et al.* (2024). The authors noted that corporate crimes, such as money laundering and bribery, have become an "epidemic" due to loopholes in legislation that are used by high-ranking officials to evade accountability. This study has demonstrated that judicial practice has begun to fill these gaps by legalising heuristic blockchain analysis as evidence. This is a critical step towards neutralising technological obfuscation of traces, as discussed by T.A. Omang *et al.* Furthermore, J. Cortese's (2022) work on public corruption in the US highlighted the link between corrupt officials and organised criminal networks. An analysis of "The case of the Krayan plant"[1] [2] confirmed the existence of such enduring links in Ukraine as well, where municipal property was being divested in favour of private entities through controlled individuals, requiring investigators to employ comprehensive tactics to neutralise the entire criminal organisation, rather than merely individual perpetrators.

It is also worth considering the cultural context of corruption, as explored by K. Artello & J.S. Albanese (2022). They argued that criminal prosecutions alone are insufficient to change the "culture of corruption", as local history and leadership have a decisive influence. These findings partly confirm this: despite successful cases of neutralisation, systemic resistance persists, transforming into new forms (legislative spam, media attacks). This suggests that neutralisation tactics must be complemented by a strategy of cultural change, as also noted by F. Ceschel *et al.* (2022), who emphasised the significance of a risk-oriented approach in the public sector.

The global context described in the textbook by F. Pakes (2024) on comparative criminal justice is noteworthy. The author analysed global trends such as the "punitive turn" and transnational policing. This study illustrated how these trends are implemented in practice. The EncroChat[3] case is an example of transnational neutralisation, where law enforcement agencies in one country (France) provide evidence to convict criminals in another (Germany), overcoming jurisdictional barriers. This opens new prospects for further research into the harmonisation of criminal procedure between the EU and Ukraine, particularly regarding the admissibility of digital evidence obtained by foreign partners. To summarise the discussion, it is possible to state that the doctrinal distinction between "overcoming" and "neutralisation" proposed in this study is not a purely theoretical construct but reflects real changes in crime-fighting tactics. The results of the analysis of judicial practice in Ukraine, the US and Germany indicate the formation of a common transatlantic standard. Effective investigation of white-collar crime is impossible without proactive measures aimed at depriving suspects of the resources (funds, positions, citizenship, technical means) they use to obstruct justice.

Conclusions

As a result of the research, the stated objective of distinguishing between the concepts of "overcoming" and "neutralising" resistance has been achieved, and the tactical tools for responding to threats during the investigation of corruption-related criminal offences have been systematised. A comprehensive analysis of sources, the regulatory framework and law enforcement practice formed several generalised scientific and practical conclusions. The study established that the tendency in legal doctrine to equate the terms "overcoming" and "neutralisation" is erroneous and reduces the effectiveness of investigative activities in the context of hybrid threats. The study demonstrated that the category of "overcoming" is retrospective in nature and aimed at removing obstacles that have already arisen, such as the restoration of destroyed documentation or the re-examination of witnesses. Such an approach requires significant time and material resources and does not guarantee the restoration of the evidence base to its original state. In contrast, "neutralisation" is defined as a proactive strategy, the essence of which lies in balancing forces or bringing the threat under control before irreversible consequences occur. A paradigm shift in the investigation of official crimes has been noted. There is a shift in focus from the physical seizure of data storage media to the intellectual and technological blocking of a suspect's ability to resist using administrative or financial resources.

A systematic analysis of judicial practice in Ukraine, the US and Germany has confirmed the effectiveness of a three-tiered neutralisation system: procedural, financial and technological. A key indicator of this model's effectiveness is the increasing number of cases in which courts have legalised the

[1] The case of the Krayan plant. (2021, March). Retrieved from https://hacc-decided.ti-ukraine.org/uk/cases/52016000000000411.
[2] Case No. 521/17260/18. (2019, July). Retrieved from https://clarity-project.info/court/decision/82973002.
[3] CaseC-670/22, M.N. (EncroChat): Judgment of the Court (Grand Chamber) (request for a preliminary ruling from the Landgericht Berlin – Germany) – Criminal proceedings against M.N. (Reference for a preliminary ruling – Judicial cooperation in criminal matters – Directive 2014/41/EU – European Investigation Order (EIO) in criminal matters – Obtaining of evidence already in the possession of the competent authorities of the executing State – Conditions for issuing an EIO – Encrypted telecommunications service – EncroChat – Need for the decision of a judge – Use of evidence obtained in breach of EU law). (2024, April). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62022CA0670.

tactic of "compromise neutralisation" through plea agreements. Empirical data, in particular the results of the case concerning an attempt to bribe the leadership of anti-corruption bodies, demonstrate that the application of this tactic has channelled over UAH 660 million into the state budget. This indicates a shift in the national legal system from a purely punitive model towards a pragmatic approach of "economic sterilisation" of crime. Under this approach, the priority is not merely the isolation of the individual – which may be complicated under remote justice conditions – but the complete deprivation of the corrupt official's financial basis for further resistance. In addition to the financial aspect, a trend towards strengthening measures to neutralise administrative resources has been identified, as evidenced by precedents involving the application of preventive measures and the revocation of citizenship from individuals who use dual status to evade accountability. The ability of pre-trial investigation bodies to conduct digital de-anonymisation has been identified as a key factor in the success of the fight against high-tech corruption. A review of international case law concerning the use of crypto-phones and cryptocurrency mixers has demonstrated that courts are prepared to accept as admissible evidence obtained through the mass breach of cryptographic security and heuristic analysis of the blockchain. For the Ukrainian legal system, this highlights the need to implement similar technical approaches and legislative regulation of the use of specialised software for covert access to secure systems, which will help to neutralise the technological advantage of organised criminal groups.

A promising area for further research is the exploration of ways to integrate artificial intelligence into the process of identifying signs of preparations for countermeasures, in particular the analysis of anomalous activity involving assets before investigative actions. It is also necessary to develop tactics for neutralising threats associated with the use of deepfake technology, which poses new challenges for the verification of evidence.

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None.

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Тактика нейтралізації протидії досудовому розслідуванню кримінальних правопорушень у сфері службової діяльності

Олександр Амелін
Кандидат юридичних наук, доцент
Офіс Генерального прокурора
01011, вул. Різницька, 13/15, м. Київ, Україна
Навчально-науковий інститут права Державного податкового університету
08201, вул. Університетська, 31, м. Ірпінь, Україна
https://orcid.org/0000-0002-0933-2111

■ **Анотація.** Метою роботи було визначення алгоритмів нейтралізації протидії та розробка системи тактичних прийомів для захисту досудового розслідування службових злочинів від деструктивного впливу. Підґрунтям дослідження було поєднання порівняльно-правового аналізу, кількісного опрацювання офіційних статистичних даних, якісного аналізу судової та слідчої практики. На основі порівняльно-правового аналізу законодавства й прецедентів України, Сполучених Штатів Америки та Федеративної Республіки Німеччина здійснено систематизацію інструментів нейтралізації та подолання опору спеціальних суб'єктів. Встановлено, що на відміну від ретроспективного подолання стратегія нівелювання загроз передбачає випереджальне блокування адміністративних і фінансових ресурсів підозрюваного до настання незворотних наслідків. За результатами аналізу емпіричних даних підтверджено ефективність трирівневої системи реагування на протидію розслідуванню, яка передбачає поєднання фінансових, технологічних і процесуальних заходів. Визначено, що пріоритетним вектором є позбавлення посадовця економічної вигоди, що підтверджується практикою арешту активів у іноземних юрисдикціях і застосуванням інституту угод. Доведено дієвість використання масового дешифрування захищених месенджерів та аналізу блокчейну для виявлення прихованих зв'язків у високотехнологічних схемах із залученням криптовалютних міксерів. Наукова робота підтверджує необхідність імплементації міжнародних стандартів відповідальності за втручання в правосуддя й розширення повноважень антикорупційних органів щодо автономного перехоплення інформації з телекомунікаційних мереж для мінімізації витоків. Практична цінність отриманих результатів полягає в можливості безпосереднього використання запропонованих рекомендацій для вдосконалення кримінального процесуального законодавства

■ **Ключові слова:** вплив; тиск; загрози; подолання; докази; арешт майна; угоди про визнання винуватості; обшук; слідчі дії; службові злочини; корупція; судова практика

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A model for determining normal and critical risk levels in the activities of the national police of Ukraine based on the mean and standard deviation

Ihor Blyzniuk*
PhD in Law
National Academy of Internal Affairs
03035, 1 Solomianska Sq., Kyiv, Ukraine
https://orcid.org/0000-0003-3882-741X

Olena Sakharova
PhD in Law
National Academy of Internal Affairs
03035, 1 Solomianska Sq., Kyiv, Ukraine
https://orcid.org/0000-0002-9759-5324

■ **Abstract.** The research relevance is determined by the need to enhance the analytical rigour, objectivity and consistency of security environment assessments in the activities of the National Police of Ukraine, given the dynamic changes in the crime situation. Approaches to determining threshold values for risk indicators, in particular those based on the use of the median, did not adequately account for the variability of statistical data, which limited their sensitivity to changes in time series and reduced the effectiveness of management decisions. The study aimed to develop a methodological model for determining normal and critical risk levels in the activities of the National Police of Ukraine based on the use of the arithmetic mean and standard deviation. Within the scope of the study, a risk assessment model was proposed, which involved determining the normal statistical range of indicator values and establishing threshold values for identifying risk levels. On this basis, an approach to classifying risk levels (stable, elevated, extreme) was formulated, which was based on the interpretation of deviations of indicators from the mean value and was used for the formalisation of the boundaries of the transition from a normal to a crisis state in the security environment. As a result of applying the model, the quantitative limits of the normal functioning of indicators and the threshold values for elevated and extreme risk levels were determined, enabling an objective comparison of their dynamics over time. Testing of the model using the indicator of serious bodily injury resulting in death confirmed its sensitivity to changes in statistical series and its suitability for the early detection of negative trends. The proposed approach was characterised by the reproducibility of results and reduced the dependence of assessments on subjective expert judgements, thereby enhancing the soundness of management decisions in the field of public safety. The results obtained can be used in the information and analytical support system for the activities of the National Police of Ukraine to monitor risks, respond promptly to their increase and optimise the allocation of resources

■ **Keywords**: risk assessment; risk indicators; risk-based approach; standard operating procedures; safety environment

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■ *Corresponding author (*blz122@ukr.net*)

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Introduction

In the current climate, characterised by an increasingly complex security environment, the proliferation of hybrid threats, transnational and organised crime, and the digitalisation of criminal activity, risk assessment in law enforcement has become of paramount importance at both national and international levels. In European Union countries and states with developed security systems, risk management in policing has been based on a risk-oriented approach, involving a systematic analysis of threats, vulnerabilities and potential consequences, followed by evidence-based management decision-making. The international risk management standards ISO 31000:2018[1] and ISO 31010:2019[2], as well as the concept of Intelligence-Led Policing (ILP), involved the use of analytically processed information to set priorities, forecast threats and the rational allocation of police resources (Ratcliffe, 2016), and were widely applied in the practice of law enforcement agencies in EU member states as a methodological basis for risk assessment, criminal analysis and ILP. These approaches focus on the use of quantitative and qualitative risk indicators, statistical methods of analysis, forecasting and resource prioritisation with the aim of enhancing the effectiveness of crime prevention and ensuring public safety.

International studies highlighted the diversity of methodological approaches to risk assessment in policing. Alongside general models of risk assessment in policing, contemporary scholarship has increasingly focused on specialised areas of risk analysis. J. Phoenix & B.J. Francis (2022) analysed risk assessment practices in missing persons cases and established their impact on the outcomes of police investigations, highlighting the importance of a systematic approach to risk analysis in operational decision-making. E. Halford (2024) applied a multidimensional scaling method to analyse the classifications used by the police when assessing missing person cases, which revealed the structure and logic of police decision-making within the context of risk assessment. S. Brayne (2020) analysed the use of data and predictive models in police work, justifying the possibility of applying formalised approaches to risk assessment based on empirical information. Thus, studies reflected the gradual development of approaches to risk assessment in policing – from the analysis of decision-making practices to the use of formalised statistical models of risk analysis. A separate area of research concerned the implementation of algorithmic and AI solutions in policing. D. Marciniak (2023) analysed data on how individual risk assessments were generated using algorithms, and how these technologies were perceived by police officers themselves in the decision-making process. Researchers Y. Ezzeddine *et al.* (2023) investigated public attitudes towards the use of artificial intelligence in policing, highlighting the need to strike a balance between enhancing security and protecting privacy. These findings demonstrated that the effectiveness of risk assessment models depends not only on their statistical accuracy, but also on the level of public trust in them and the acceptability of their use by law enforcement agencies. The interdisciplinary nature of contemporary approaches to risk assessment is reflected in the study by I.M. Sunde (2025), which examines the police risk assessment system in domestic violence cases in Norway and its connection to the state's international legal obligations regarding security. The authors A. Lyall *et al.* (2023) studied the use of a pre-release risk assessment tool, demonstrating its potential for practical application in police work. T. Cranshaw *et al.* (2025) assessed the sensitivity of a specialised health screening tool for detainees, emphasising the significance of empirically validated assessment procedures in specific areas of police work. C. Logan (2022) highlighted the conceptual distinction between threat assessment and risk assessment in law enforcement, thereby clarifying the analytical foundations of modern security governance.

In Ukraine, in the context of Russian full-scale military aggression, the escalation of crime-related risks, the evolution of organised crime, and the increasing strain on the law enforcement system, the issue of introducing scientifically sound risk assessment methodologies into the operations of the National Police of Ukraine has become a matter of great importance. In their day-to-day activities, National Police units conducted continuous risk assessments of various types of crime, in particular organised crime and serious offences (Serious and Organised Crime Threat Assessment (SOCTA)[3]), identified trends in security processes and ensured an effective response to threats, covering available resources and using analytical, statistical and predictive tools. However, risk-oriented models in policing were increasingly applied not only to forecast crime-related processes, but also to assess the legitimacy, accountability and quality of policing. In particular, this concerned the assessment of harm caused by police misconduct, the use of force and the implementation of law enforcement accountability policies. Thus, an analysis of contemporary academic sources has demonstrated

[1] ISO 31000:2018. (2018). *Risk management – guidelines*. Retrieved from https://www.iso.org/standard/65694.html.
[2] ISO 31010:2019. (2019). *Risk management – risk assessment techniques*. Retrieved from https://www.iso.org/standard/72140.html.
[3] Europol. (2021). *European Union serious and organised crime threat assessment (SOCTA) 2021*. Luxembourg: Publications Office of the European Union.

the expansion of the scope of risk analysis in policing – from the assessment of crime-related processes to ensuring the accountability, legitimacy and effectiveness of law enforcement agencies. The study aimed to justify and develop a methodology for assessing risks based on statistical indicators of risk in the activities of the National Police of Ukraine, with the identification of normal and critical risk levels in police operations based on an analysis of time series data for 2021-2025, mean values and standard deviations. To achieve this aim, the article addressed the following tasks:

1) to determine the role of statistical indicators in the risk-based management system for police operations;

2) to propose an approach to classifying risk levels (stable, elevated, high) based on quantitative indicators;

3) to demonstrate the potential for the practical application of the developed methodology in supporting management decisions within the National Police of Ukraine.

The scientific novelty of the study is determined by the development of a comprehensive approach to risk assessment within the Ukrainian National Police, based on statistical data from risk indicators. This can be used for a quantitative assessment of the security environment, identifies trends in risk changes over time, and enhances the effectiveness of risk-based management in the fields of public safety and crime prevention.

Materials and Methods

The methodological framework of the study was based on the principles of risk-based management and risk assessment methods noted in ISO 31000:2018[1] and ISO 31010:2019[2], which have been widely applied in European law enforcement practice. In international policing practice, the use of formalised risk assessment tools covered both general criminal analysis and highly specialised areas related to the assessment of vulnerability, harm, violence, missing persons, the health of detainees and interagency response. This confirmed the advisability of developing unified and transparent statistical procedures for risk assessment in the activities of the National Police of Ukraine. The assessment of the security environment in Ukraine within the Ministry of Internal Affairs was conducted following the Methodological Recommendations on the Determination (Assessment) of the Security Environment in Ukraine, approved on 26 December 2023 (internal document, not published). This approach was based on determining the upper limit of the normal range for each security environment indicator using the statistical median as the central tendency, which minimised the impact of extreme values in the time series and ensured the robustness of the assessment against outliers. This approach proved appropriate in cases of high data variability or the presence of isolated anomalous spikes in indicators.

The methodology proposed in the study for assessing risks based on statistical indicators of risk in the activities of the National Police of Ukraine was based on standard statistical procedures and official data, ensuring that it was fully reproducible. Provided that similar indicators and time series are used, it can be applied to assess risks at the regional level or adapted to the activities of other law enforcement agencies. Furthermore, the study proposed an alternative approach to risk assessment in the activities of the National Police of Ukraine, which was based on the use of the arithmetic mean and standard deviation (σ) to determine the normal statistical range of risk indicators. The mean (μ) was calculated using the formula:

$$\mu = \frac{\sum xi}{n}, \quad (1)$$

where x_i – risk indicator values by year; n – number of years analysed; μ – arithmetic mean. Standard deviation (σ) was calculated using the following formula:

$$\sigma = \frac{\sqrt{\sum(xi-\mu)2}}{n}, \quad (2)$$

where x_i – risk indicator values by year; μ – arithmetic mean; n – number of years analysed; σ – standard deviation. The "normal" range (the limits of the normal level) was determined using the following formula:

$$d = \mu \pm \sigma, \quad (3)$$

where d – normal range; μ – arithmetic mean; σ – standard deviation. Thus, applying this formula made it possible to obtain the lower limit of the risk indicator (μ - σ) and the upper limit of this indicator (μ + σ). The threshold for the risk indicator's emergency level was calculated using the following formula:

$$p = \mu + 2\sigma, \quad (4)$$

where p – emergency threshold of the risk indicator; μ – arithmetic mean; σ – standard deviation. The empirical basis of the study was provided by official statistics on the activities of the National Police of Ukraine (Prosecutor General's Office, n.d.)[3], which reflected the state of the crime and security situation.

[1] ISO 31000:2018. (2018). *Risk management – guidelines*. Retrieved from https://www.iso.org/standard/65694.html.
[2] ISO 31010:2019. (2019). *Risk management – risk assessment techniques*. Retrieved from https://www.iso.org/standard/72140.html.
[3] Prosecutor of General's Office. (n.d.). *About registered criminal offenses and the results of their pretrial investigation*. Retrieved from https://gp.gov.ua/ua/posts/pro-zareyestrovani-kriminalni-pravoporushennya-ta-rezultati-yih-dosudovogo-rozsliduvannya-2.

For each risk indicator, time series were compiled covering a period of at least five consecutive years, ensuring comparability over time and enabling the identification of sustained trends. This sampling time horizon was consistent with approaches in statistical risk analysis and prevented distortions associated with short-term fluctuations or isolated crisis events. The time series took the form: $x_1, x_2, x_3, \ldots, x_i$, where x_i – value of the corresponding risk indicator for the *i*-th year of observation, and $n \geq 5$. Time series were characterised by temporal ordering of values; homogeneity of indicators (a single indicator within a single series); the ability to identify trends (increase, decrease or stabilisation); and suitability for further statistical analysis (calculation of the mean, standard deviation and determination of risk thresholds). The use of time series of this structure ensured the comparability of indicators over time, reduced the impact of random fluctuations in individual years, and provided a well-founded determination of the limits of normal functioning of risk indicators. In the proposed methodology for assessing risks based on statistical indicators of risk in the activities of the National Police of Ukraine, the normal statistical range for each risk indicator was defined as an interval:

$$\mu \pm 1\sigma, \quad (5)$$

where μ – arithmetic mean of the indicator for the period under review, σ – standard deviation. This approach made it possible to define the limits of typical fluctuations in the indicator in the absence of significant deviations. According to the laws of the normal distribution (Gaussian or Gauss-Laplace), approximately 68% of observations[1] decreased within one standard deviation of the mean, making this method suitable for monitoring the stability of the security environment and the early detection of risky changes. In cases where it was necessary to determine the central tendency (mean) without the influence of outliers from individual years, it was appropriate to use the statistical median. Conversely, for assessing the controllability and variability (stability) of the security situation, the use of the mean in combination with the standard deviation proved more informative. Based on the calculated statistical limits, risk indicators were classified according to the proposed methodology for assessing risks using statistical indicators of risk in the activities of the National Police of Ukraine into three levels of the security environment: stable level (low risk) – the indicator value falls within the range of $\mu \pm 1\sigma$; crisis level (elevated risk) – the value exceeds the upper limit of the normal range; emergency level (high risk) – a sustained or sharp deviation of the indicator beyond the established statistical thresholds.

The assessment of risks based on statistical indicators of risk in the activities of the National Police of Ukraine was founded on the following principles: 1) systematic approach – risk analysis was conducted separately for each indicator, with the results subsequently integrated; 2) objectivity – use of exclusively formalised statistical methods (mean (μ) and standard deviation (σ)), which minimised the subjective influence of expert assessments; 3) comparability over time – the use of time series data covering a period of at least five years; 4) ease of interpretation – the results obtained can be directly used in management decisions and analytical reports. At the same time, the use of the median did not provide the degree of variability of the indicators and the intensity of their fluctuations over time to be considered. The approach proposed in the study, based on the arithmetic mean and standard deviation ($\mu \pm \sigma$), was used to assess not only of the central tendency but also of the dispersion of the indicator's values, which made it possible to formalise the limits of the system's "normal" functioning and to determine the threshold values for the transition to elevated and extreme risk levels. Thus, the median approach proved more robust to outliers and suitable for initial aggregate analysis, whilst the $\mu \pm \sigma$ approach was more informative for analytical monitoring, trend identification and early warning of changes in the security environment.

Results and Discussion

Risk assessment within the Ukrainian National Police required not only the collection of statistical data, but also the application of formalised methodological approaches to its interpretation. In the current context, the effectiveness of risk-based management depended to a large extent on the ability of law enforcement agencies to use reproducible and statistically sound mechanisms for assessing the security environment. In this context, the integration of international risk management standards and quantitative analysis methods into the practice of the police's information and analytical activities took on particular significance. The risk-oriented approach in the activities of the National Police of Ukraine involved structuring the analysis of information on threats, vulnerabilities and the potential consequences of their materialisation in the sphere of national, economic and public (civil) security and order, as well as in the fight against crime. The application of this approach was aimed at improving

[1] OpenStax. (n.d.). *6.1 The Standard Normal Distribution*. Retrieved from https://openstax.org/books/introductory-statistics-2e/pages/6-1-the-standard-normal-distribution.

the soundness of management decisions, optimising the allocation of resources, and identifying priority areas of police activity. The ultimate objective of applying the risk-based approach within the units of the National Police of Ukraine was to identify risks in the system through which these units ensure public safety and order, combat crime, determine the elements of risk management, assess these risks, and contribute to the development of a strategy for the security system. The risk analysis toolkit used by officers of the National Police of Ukraine was based on the processing of large volumes of data using general and specialised methods, standards, standard operating procedures based on a risk-oriented approach, methodologies for risk analysis and assessment, information and analytical activities, strategic management and forecasting. This also involved the use of relevant international standards on the risk-based approach and foresight capabilities as part of the decision-making policy within the bodies (agencies, institutions) of the National Police of Ukraine. The information and analytical units of the National Police of Ukraine were central in implementing the risk-based approach; their activities involve processing large datasets, using statistical and forecasting methods, criminal analysis, geoinformation systems, predictive analytics, analytical monitoring and specialised threat assessment tools, in particular SOCTA.[1], IOCTA[2] and EOCTA[3].

The systematisation of statistical indicators of the security environment and their analysis over time have laid the groundwork for a formalised assessment of risks in the activities of law enforcement agencies. The application of quantitative methods ensured transition from a descriptive analysis of indicators to their interpretation through the definition of objective boundaries for normal and abnormal system functioning. In this context, the development of a reproducible model became significant, as it identified changes in the security environment based on statistically sound criteria. On this basis, a methodology for assessing risks using statistical indicators in the activities of the National Police of Ukraine was developed and tested, which made it possible to determine the quantitative boundaries of stable, heightened and emergency states of the security environment based on mathematical analysis of dynamic data series. The methodology was designed to determine whether the crime and security situation was in a stable, heightened or emergency state through a formalised analysis of long-term statistical time series. The assessment was conducted using a system of statistical indicators reflecting the state of the crime and security situation within the remit of the National Police of Ukraine, based on data covering a long period (at least five years). As part of the methodology developed, key statistical parameters – the arithmetic mean (μ) and standard deviation (σ) – were determined for each risk indicator, enabling the establishment of a normal statistical range for the indicator's performance and critical threshold values. This approach was consistent with the general principles of risk management stipulated in ISO 31000:2018[4], according to which risk assessment should be based on systematic, reproducible and objective data analysis. At the same time, the use of statistical parameters such as the mean and standard deviation is consistent with the logic of ISO 31010:2019[5], which provided for the application of quantitative risk assessment methods to support decision-making under conditions of uncertainty.

Based on these parameters, quantitative criteria for differentiating risk levels were proposed, according to which: 1) stable state (low risk level) – the indicator value does not exceed the upper limit of the normal statistical range (μ + σ); 2) elevated risk level – the value exceeds the upper limit of the normal range but does not reach the critical threshold (μ + 2σ); 3) extreme risk level – the value equals or exceeds the critical threshold (μ + 2σ), indicating a deterioration in the security situation. To determine the comparative values of indicators for identifying a stable, crisis and emergency state of the security environment, as maintained by the National Police units, it is necessary to establish the upper limit of the normal level for each indicator, which serves as a baseline for determining what falls within the scope of a stable, crisis and emergency state of the security environment. The determination of the upper limit of the normal range for each indicator was based on a time series and the calculation of the mean (μ) and standard deviation (σ). Consequently, data series for the years 2021-2025 were compiled for each risk indicator. Based on this data, the following were calculated: the mean (μ); the standard deviation (σ); the upper limit of the normal range (μ + σ); the lower limit of the normal range (μ - σ); and the threshold for the emergency level (μ + 2σ). The corresponding criteria for classifying risk levels are summarised in Table 1.

[1] Europol. (2021). *European Union serious and organised crime threat assessment (SOCTA) 2021*. Luxembourg: Publications Office of the European Union.
[2] Europol. (2025). *Internet organised crime threat assessment (IOCTA) 2024*. Luxembourg: Publications Office of the European Union.
[3] Europol. (2024). *Internet organised crime threat assessment (IOCTA) 2023*. Luxembourg: Publications Office of the European Union.
[4] ISO 31000:2018. (2018). *Risk management – guidelines*. Retrieved from https://www.iso.org/standard/65694.html.
[5] ISO 31010:2019. (2019). *Risk management – risk assessment techniques*. Retrieved from https://www.iso.org/standard/72140.html.

Table 1. Criteria for determining the security environment in the sphere of activity of the National Police of Ukraine

Risk level	Interpretation	Criteria
Stable	Figures within the normal range of statistical variation	Value ≤ μ + σ
Elevated	Reading is above the normal range, but does not exceed the critical threshold	μ + σ < Value < μ + 2σ
Extraordinary	Figures demonstrate a critical deterioration in the security situation	Value ≥ μ + 2σ

Source: compiled by the authors

The practical application of the risk assessment methodology based on statistical indicators of risk in the activities of the National Police of Ukraine is illustrated by the example of the risk indicator "number of cases of grievous bodily harm resulting in death detected by the National Police". For this indicator, a time series of values was compiled for the years 2021–2025: 2021 – 480, 2022 – 410, 2023 – 379, 2024 – 353, 2025 – 337[1]. On this basis, the upper limit of the normal (standard/stable) level and the critical threshold for this risk indicator were determined. Thus, the arithmetic mean for the risk indicator "number of cases of grievous bodily harm resulting in death detected by the National Police" was:

$$391.8 = \frac{(480 + 410 + 379 + 353 + 337)}{5}.$$

The standard deviation (σ) was calculated as the square root of the mean of the squares of the deviations of the actual values from the arithmetic mean, using the formula:

$$\sigma = \frac{\sqrt{\sum(480-391.8)2+(410-391.8)2+(379-391.8)2+ + (353-391.8)2+(337-391.8)2}}{5} \approx 50.6.$$

The calculation resulted in a standard deviation of approximately 50.6 cases. The standard deviation determined the typical level of variation in the risk indicator "number of cases of grievous bodily harm resulting in death detected by the National Police" and the boundaries of the "normal" range. The lower limit of the risk indicator was ≈ 341 (391.8 - 50.6), and the upper limit was ≈ 442 (391.8 + 50.6). The threshold for the extreme level of the risk indicator "number of cases of grievous bodily harm resulting in death detected by the National Police" was:

$$p = 391.8 + 2 \times 50.6 = 493.$$

Thus, the results of the statistical analysis of this risk indicator showed that the mean value of the indicator for the period under review was μ = 391.8, and the standard deviation was σ = 50.6. Accordingly, the upper limit of the normal level of the indicator was set at ≈442 cases per year, whilst the critical threshold for the emergency level was ≈493 cases per year. If the figure exceeded 442, the security situation could be assessed as deteriorated. If the excess is significant (over 493 cases), this constitutes an emergency risk level. The state of the security environment within the remit of the National Police of Ukraine for 2025, as measured by the indicator "number of cases of grievous bodily harm resulting in death detected by the National Police", was 337. Thus, a comparison of this indicator value with the upper limit and the threshold for the extreme risk level concluded that the value of the risk indicator "number of cases of grievous bodily harm resulting in death detected by the National Police" in 2025 did not exceed the upper limit of the normal range (337 < 442) and did not reach the critical threshold (337 < 493). At the same time, the value of this indicator in 2025 was below the lower limit of the normal range (337 < 341), which may indicate a structural decline in the indicator or a change in crime trends. Consequently, the status of the indicator "number of cases of grievous bodily harm resulting in death detected by the National Police" in 2025 is stable. The figures established quantitative thresholds for risk levels for the indicator under study (Table 2).

Table 2. Risk levels for the indicator "number of cases of grievous bodily harm resulting in death detected by the National Police"

Level	Formula	Range of values	Interpretation
Stable (normal)	μ ± 1σ	up to 442	Controlled situation Stable security environment
Advanced (difficult)	from μ + 1σ to μ + 2σ	442-493	Increased risk
Extraordinary	>μ + 2σ	more than 493	Crisis (uncontrolled) situation in the security environment

Source: compiled by the authors

[1] Prosecutor of General's Office. (n.d.). *About registered criminal offenses and the results of their pretrial investigation*. Retrieved from https://gp.gov.ua/ua/posts/pro-zareyestrovani-kriminalni-pravoporushennya-ta-rezultati-yih-dosudovogo-rozsliduvannya-2.

An interpretation of the results of the risk assessment for serious bodily harm resulting in death for the year 2025 showed that the actual value of the indicator (337 cases) was below the upper limit of the normal statistical range and did not reach the critical threshold for an extreme level of risk. The analysis confirmed that the methodology proposed in the study can be used for a quantitative assessment of the security environment by comparing the actual values of the indicators with statistically determined threshold levels. The use of the arithmetic mean and standard deviation made it possible to formalise the risk assessment procedure, ensure the reproducibility of results, and interpret changes in the security environment based on objective statistical criteria. The proposed approach made it possible to identify in a timely manner transitions from a stable security environment to an elevated or extreme level of risk without the use of subjective expert scales.

J. Chen *et al.* (2024) argued for the need for an integrated assessment of security risks that considers the spatial distribution of crime, socio-economic indicators and police resource allocation, emphasising that most existing studies have focused solely on specific types of crime, overlooking the complex nature of security risks. A systematic review by H. Ryland *et al.* (2025) demonstrated the variability of risk assessment tools used in police practice, as well as the inconsistency in their predictive accuracy, highlighting the need for standardised, statistically sound methodological approaches. The role of data in modern police analytics was further explored in the work of M. Afzal & P. Panagiotopoulos (2025), who classified police information resources into targeted, automated and crowdsourced data, emphasising their importance in forming the evidence base for risk assessment. Similar conclusions regarding the significance of information technology, algorithmic analytics and digital tools in decision-making within policing were reflected by T. Bäckman *et al.* (2025), who analysed technological (digital and algorithmic) alert systems designed to support law enforcement responses in situations related to mental health crises. The study demonstrated that such systems can improve inter-agency information sharing and facilitate the rapid coordination of decisions, whilst raising questions regarding data quality, compliance with the principle of proportionality, and the need for appropriate ethical safeguards when using algorithmically generated risk information. Research into predictive policing, notably the study by I. Mugari & E.E. Obioha (2021), has demonstrated the potential of algorithmic crime prediction, whilst also highlighting the ethical and methodological limitations inherent in such models.

A separate area of contemporary research focuses on the practical validity and applicability of risk assessment tools in policing. J. Richardson & K. Norris (2021) analysed the effectiveness of risk-screening tools in policing, highlighting their evidence base, limitations in predictive accuracy, and the need for proper training of police officers to use them effectively, whilst A.S. Almasoud & J.A. Idowu (2025) investigated the issue of algorithmic fairness in predictive police analytics systems, highlighting the risks of structural bias, lack of algorithmic transparency, and the need to ensure legal and ethical safeguards when using crime prediction models. The issue of interpreting statistical data and developing professional competence in the field of risk management was examined by C. Zimmermann (2025), who emphasised the importance of statistical literacy for the effective management of security processes. The study by L.M. Dario *et al.* (2024) demonstrated the potential for quantitatively assessing the harm caused by unlawful police actions, thereby expanding the scope of risk analysis. S. Skinner (2024) emphasised the global mechanisms of law enforcement accountability, particularly in the context of the use of lethal force. H. Zare *et al.* (2025) examined the prevalence of accountability policies across different jurisdictions, highlighting the role of risk-based approaches in ensuring oversight of police activities.

The approach to risk assessment proposed in the study, based on the arithmetic mean and standard deviation, had a range of significant advantages. First and foremost, it ensured the formalisation and reproducibility of results, as it was based on standard statistical procedures that minimised the subjective influence of expert assessments. Furthermore, this method addressed not only the central tendency but also the variability of indicators over time, which increased sensitivity to changes in the security environment. Its simplicity of interpretation and the possibility of practical application within the constraints of the limited analytical resources of the National Police of Ukraine's units were also significant advantages. At the same time, the proposed approach had certain limitations. In particular, the use of the interval $\mu \pm \sigma$ was most appropriate when the distribution of indicators approximated a normal distribution, whereas in real-world conditions, statistical series of crime-related indicators may be asymmetric or contain outliers. In such cases, the boundaries of the "normal" range may be distorted. Furthermore, the methodology did not account for structural changes in the environment (for example, the influence of military factors or reforms), nor did it address the ethical and legal issues that arose in more complex systems of algorithmic risk assessment (Wachter *et al.*, 2021), which might have required further adjustment of the models. It is therefore advisable to combine further development of risk assessment methodologies based on statistical indicators of risk in the activities of the National Police of Ukraine with the integration of multidimensional analysis.

Conclusions

The methodology for assessing risks in the activities of the National Police of Ukraine, which was developed and methodologically substantiated, was based on the use of the arithmetic mean and standard deviation as tools for determining the boundaries of the normal statistical range of risk indicators. The approach proposed in the study provided a shift from a fragmented description of individual statistical indicators to a systematic quantitative interpretation of risk levels in the field of policing and provided the means for a unified assessment of the security environment based on mathematically defined criteria. The calculations revealed that the application of the interval $\mu \pm \sigma$ ensured an objective determination of typical fluctuations in the values of risk indicators and provided a basis for identifying statistically significant deviations, which may indicate a deterioration in the crime situation or destabilisation of the security environment. Using the indicator "number of cases of grievous bodily harm resulting in death detected by the National Police" for the period 2021-2025, the arithmetic mean was determined to be $\mu = 391.8$ and the standard deviation $\sigma = 50.6$. The study established that the upper limit of the normal statistical range was approximately 442 cases per year, whilst the critical threshold for an extreme level of risk was around 493 cases. The value of the indicator for 2025 (337 cases) did not exceed the specified thresholds, which classified the indicator as stable. The actual value of the indicator in 2025 was below the lower limit of the normal statistical range (≈ 341), indicating structural changes in the dynamics of this type of criminal offence. The study demonstrated that the use of statistical series spanning at least five years ensured the comparability of results over time and minimised the impact of random fluctuations in individual periods. In contrast to approaches based exclusively on median values, the proposed methodology addressed not only of the central tendency but also of the degree of variability in the indicators across time series. Prospects for further research include the study of statistically oriented models for analysing the security environment in the activities of Ukraine's law enforcement agencies and the establishment of unified risk thresholds for different categories of indicators.

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Conflict of Interest

None.

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Модель визначення нормальних і критичних рівнів ризику в діяльності Національної поліції України на основі середнього значення та стандартного відхилення

Ігор Близнюк
Кандидат юридичних наук
Національна академія внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ, Україна
https://orcid.org/0000-0003-3882-741X

Олена Сахарова
Кандидат юридичних наук
Національна академія внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ, Україна
https://orcid.org/0000-0002-9759-5324

■ **Анотація.** Актуальність дослідження зумовлена необхідністю підвищення аналітичної обґрунтованості, об'єктивності та послідовності оцінювання безпекового середовища в діяльності Національної поліції України в умовах динамічних змін криміногенної ситуації. Підходи до визначення порогових значень індикаторів ризику, зокрема ґрунтовані на використанні медіани, не забезпечували належного врахування варіативності статистичних даних, що обмежувало їх чутливість до змін у часових рядах і знижувало ефективність управлінських рішень. Метою статті стало розроблення методологічної моделі визначення нормальних і критичних рівнів ризику в діяльності Національної поліції України на основі використання середнього арифметичного значення та стандартного відхилення. У межах дослідження запропоновано модель оцінювання ризиків, що передбачало визначення нормального статистичного діапазону значень індикаторів і встановлення порогових значень для ідентифікації рівнів ризику. На цій підставі сформовано підхід до класифікації рівнів ризику (стабільний, підвищений, надзвичайний), який ґрунтувався на інтерпретації відхилень показників від середнього значення і дав змогу формалізувати межі переходу від нормального до кризового стану безпекового середовища. Унаслідок застосування моделі було визначено кількісні межі нормального функціонування індикаторів і порогові значення підвищеного та надзвичайного рівнів ризику, що забезпечувало можливість об'єктивного порівняння їх динаміки в часі. Апробація моделі на прикладі індикатора тяжких тілесних ушкоджень зі смертельними наслідками засвідчила її чутливість до змін статистичних рядів і придатність для раннього виявлення негативних тенденцій. Запропонований підхід характеризувався відтворюваністю результатів і знижував залежність оцінювання від суб'єктивних експертних суджень, що підвищувало обґрунтованість управлінських рішень у сфері публічної безпеки. Отримані результати може бути використано в системі інформаційно-аналітичного забезпечення діяльності Національної поліції України для моніторингу ризиків, своєчасного реагування на їх підвищення та оптимізації розподілу ресурсів

■ **Ключові слова:** оцінювання ризиків; індикатори ризику; ризик-орієнтований підхід; стандартні операційні процедури; безпекове середовище

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Biometric registration of public servants: Between state security and the right to privacy

Mykola Komissarov*
PhD in Law, Associate Professor
Centre for Internal Special-Purpose Security "Hard", National Guard of Ukraine
03151, 9A Svyatoslav Khorobryho Str., Kyiv, Ukraine
https://orcid.org/0000-0001-6828-7974

Natalia Komissarova
PhD in Law, Associate Professor
Kyiv Institute of the National Guard of Ukraine
03180, 7 Oborony Kyiva Str., Kyiv, Ukraine
https://orcid.org/0000-0001-6895-6891

■ **Abstract.** This article examines the legal regulation of mandatory fingerprinting of civil servants as a mechanism for identity verification, integrity assurance, and security in public administration. Using comparative legal and formal legal methods, legislation of Ukraine, European Union member states, and the United States is analysed with respect to the collection and processing of fingerprint data of persons holding or applying for public service positions. The practice of the European Court of Human Rights in "S. and Marper v. the United Kingdom" and "Gaughran v. the United Kingdom", and the Court of Justice of the European Union in Case No. C-371/24 "Comdribus", are systematised. The principal results are as follows. Ukraine has no statutory provision for fingerprinting upon entry to public service – for civilian servants, police officers, or military personnel alike – constituting a structural vulnerability of the public administration integrity system. The approach that the General Data Protection Regulation prohibits such registration is shown to be doctrinally erroneous: Article 9(2)(g) General Data Protection Regulation expressly permits processing of biometric data on grounds of substantial public interest where a proper statutory basis exists. A differentiated model for introducing fingerprinting compatible with European Court of Human Rights, Court of Justice of European Union, and General Data Protection Regulation standards is substantiated. The wartime dimension – identification of fallen military personnel – is identified and its normative resolution proposed. The adoption of a Law of Ukraine "On Biometric Registration" with a differentiated approach to position categories, clear data protection guarantees, and phased implementation is the primary legislative step required

■ **Keywords**: biometric registration; personal data protection; civil service integrity; right to privacy; identification of the fallen

■ Introduction

The question of whether civil servants should be subject to mandatory fingerprint registration upon entry to public service has acquired particular normative urgency in Ukraine in 2026 for reasons that are simultaneously legal, institutional, and humanitarian. Ukraine's ongoing accession to the European Union (EU) requires demonstrated compliance with supranational data protection standards that directly govern the permissibility of biometric registration by public authorities – a legislative task that remains unaddressed at the statutory level. Concurrently, conditions of full-scale armed conflict have exposed with

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■ *Corresponding author (*nikkorov@ukr.net*)

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unprecedented clarity the practical consequences of the absence of a pre-existing biometric record for public servants and military personnel: the inability to rapidly identify those missing or killed in the line of duty. From a theoretical standpoint, the subject reveals a structural blind spot in Ukrainian administrative law: the administrative-law dimension of biometric registration has received virtually no doctrinal treatment, despite its direct implications for civil service integrity, access to classified information, and the protection of fundamental rights. Addressing this gap is therefore not merely a matter of legislative technique but a condition of Ukraine's capacity to meet its European integration commitments whilst simultaneously safeguarding the rights of persons subject to biometric data collection by the state.

The most recent scholarship has addressed specific dimensions of this problem from several directions. S. Knyzhenko & O. Sharaban (2023) examined the legal regulation of the fingerprint registration system maintained by the Ministry of Internal Affairs of Ukraine, concluding that the existing normative framework is marked by significant internal contradictions and leaves fundamental questions of data retention, access, and oversight unresolved at the statutory level. Y. Orlov & N.O. Pribytkova (2022) analysed the impact of armed conflict on criminal law policy in Ukraine, establishing that the conditions of full-scale war create a heightened institutional demand for reliable biometric identification procedures that existing legislation is structurally unprepared to meet. D.J. Solove & P.M. Schwartz (2019) examined contemporary privacy law frameworks across multiple jurisdictions, demonstrating that effective statutory regulation of biometric data must incorporate purpose-limitation, proportionality, and rights-of-access guarantees as non-derogable minimum standards. A.K. Jain *et al.* (2011) established the foundational technical and normative parameters of contemporary biometric recognition systems, demonstrating that fingerprint identification achieves operational reliability only when embedded within a comprehensive identity management infrastructure governed by transparent legal rules. D. Lyon (2009) analysed the social and political dimensions of state-mandated biometric identification schemes, concluding that their democratic legitimacy is contingent upon robust accountability mechanisms and clearly delimited statutory purposes. B. Loomis & K. Bowerman (2025) studied the operational use of biometric intelligence in grey zone conflicts within the NATO framework, concluding that the institutional reliance on biometric data in allied security architectures generates direct normative expectations for member states to maintain pre-existing biometric records of their military personnel. The Media Initiative for Human Rights (2024) investigated the identification of persons missing as a result of the armed conflict, establishing that the absence of pre-existing biometric records of military personnel extends the identification timeline to fourteen months in DNA-based procedures – a delay that would be substantially reduced by systematic prior fingerprint registration. ZMINA (2025) documented the search and identification practices applied to persons missing during the war, revealing that existing institutional capacities are critically insufficient and that biometric data infrastructure represents the primary systemic gap requiring legislative remedy. Notwithstanding this growing body of literature, a comprehensive administrative-law study of the legal vacuum in the sphere of fingerprinting public servants in Ukraine – integrating European Court of Human Rights (ECtHR) and Court of Justice of European Union (CJEU) standards with the wartime identification dimension – has not been undertaken.

The aim of this study was, on the basis of a comparative legal analysis of the legislation and judicial practice of Ukraine, the EU, and the USA, to determine the state of legal regulation of fingerprinting of persons holding positions in public service and to formulate scientifically grounded proposals for the improvement of national legislation. To achieve this aim, three interrelated objectives were pursued: (1) to establish the theoretical and legal foundations of fingerprinting in the public administration system, including the legal status of fingerprint data as a category of personal data; (2) to conduct a comparative legal analysis of the relevant legislation and judicial practice of the USA, EU member states, and post-Soviet states, with particular attention to the standards established by the ECtHR and the CJEU; (3) to identify the systemic gaps in the national legal framework and to substantiate a model of legislative regulation compatible with international human rights standards. The scientific novelty of the research consists of the first comprehensive characterisation of the legal vacuum in the sphere of fingerprint registration of public servants in Ukraine, the justification of a differentiated model for the introduction of fingerprinting consistent with ECtHR, CJEU, and GDPR standards, and the identification of the wartime identification dimension as a specific normative problem requiring legislative resolution.

Literature Review

The scholarly literature on biometric registration and fingerprinting in the public law context may be structured around three principal streams: criminalistic and forensic studies, data-protection and privacy scholarship, and public administration and security research. The following review focuses on foundational works that established the analytical parameters of the field, whilst the most recent

contributions (2021 onwards) have been incorporated into the Introduction above.

Within the first stream, V. Zakharov & V. Rudeshko (2015) produced a foundational monograph on biometric technologies and their application by law enforcement agencies, examining dactyloscopy as a core identification instrument from both technical and legal perspectives and concluding that the legal regulation of biometric identification in Ukraine required substantial modernisation. H. Bidniak (2017) analysed the normative-legal regulation of fingerprinting of persons in Ukraine, identifying significant statutory lacunae and arguing that the absence of a comprehensive legislative framework created risks of arbitrary application of existing subordinate acts by executive authorities. Together, these works established that the criminalistic dimension of dactyloscopy in Ukraine was substantively regulated, whilst the administrative dimension – specifically, the fingerprinting of public servants – remained entirely unaddressed.

The data-protection and privacy stream has produced the most theoretically sophisticated treatment of the subject. E.J. Kindt (2013) conducted a landmark comparative legal analysis of biometric applications across multiple jurisdictions, establishing that biometric data possess a uniquely sensitive character – owing to their immutability and potential link to criminal registers – and concluding that national legislative frameworks must incorporate proportionality, purpose-limitation, and data-minimisation principles as minimum standards. P. De Hert & A. Sprokkereef (2008) examined the tension between the deployment of biometric data by public authorities and the requirements of EU data protection law, arguing that the emerging "biometric state" tendency must be constrained by the necessity and proportionality principles enshrined in both the ECHR and the EU fundamental rights. A.F. Westin (2003) explored the social and political dimensions of informational privacy, demonstrating that the level of public trust in state biometric practices is contingent on the strength of procedural guarantees and the degree of democratic oversight. E. Mordini & D. Tzovaras (2012) edited a comprehensive collection examining the ethical, legal, and social context of second-generation biometrics, concluding that emerging biometric technologies demand a regulatory response that is adaptive, rights-based, and sensitive to the distinction between public-order and private-sector applications.

K.D. Haggerty & R.V. Ericson (2000) developed the concept of the "surveillant assemblage," arguing that contemporary surveillance systems increasingly combine disparate forms of personal data into integrated digital identities, thereby transforming traditional understandings of privacy and state monitoring. Their analysis is directly relevant to biometric registration of public servants because it demonstrates that biometric identifiers, once incorporated into interconnected state databases, may facilitate pervasive forms of administrative surveillance that require strict legal limitations, proportionality safeguards, and democratic oversight. C.J. Bennett (2010) examined the emergence of transnational privacy advocacy networks resisting the expansion of surveillance technologies, including biometric identification systems, data profiling, and state monitoring practices, arguing that privacy protection increasingly depends on civil-society mobilisation and democratic oversight rather than solely on formal legal safeguards.

J. Ashbourn (2014) substantially expanded the discussion of biometrics beyond purely technical and forensic considerations by examining biometric identity management within the broader contexts of cloud computing, mobile technologies, and transnational data infrastructures. The author demonstrated that the increasing integration of biometric systems into public administration and digital governance creates heightened risks for informational privacy, particularly where biometric identifiers are processed across institutional and geographic boundaries without sufficiently robust safeguards, oversight mechanisms, and purpose limitations. In the context of biometric registration of public servants, J. Ashbourn (2014) work is especially significant because it frames biometrics not merely as a security instrument, but as a component of pervasive identity management that requires a careful balance between state security interests and the protection of individual privacy rights. R. Brownsword & M. Goodwin (2012) examined the interaction between emerging technologies, regulatory systems, and fundamental rights in the twenty-first century, arguing that modern legal frameworks increasingly struggle to balance technological efficiency with the preservation of individual autonomy and privacy. In the context of biometric registration of public servants, the work is significant because it conceptualises biometric surveillance and identity management as part of a broader transformation toward technologically mediated governance, where security-oriented state practices must remain constrained by proportionality, accountability, and human-rights protections.

The third stream – addressing institutional and security dimensions – has generated insights of direct relevance to the present study. M. Zwanenburg (2012) examined the intersection of biometric data collection and international humanitarian law, establishing that the collection of biometric information from persons in the context of armed conflict raises specific legal obligations under the Geneva Conventions and customary international humanitarian law, with particular implications for the identification of casualties. L. Zouhar & M.G. Bartoszewicz (2022) demonstrated, in a different but

methodologically instructive context, that the formal legal regime governing the classification of objects – rather than their physical properties – determines which instruments are actually encountered in practice; this insight is directly applicable to the analysis of biometric registration regimes, where the formal legal status assigned to fingerprint data determines the scope of rights and obligations of the persons whose data are collected.

The foregoing review reveals two significant gaps in the existing literature. First, whilst the international and comparative scholarship has extensively theorised the conditions for lawful biometric data collection in general terms, the specific administrative-law question of the fingerprinting of public servants – as distinct from criminal registration – has not been subjected to systematic doctrinal analysis in the Ukrainian context. Second, the wartime dimension of the problem – namely, the use of prior fingerprint registration records for the identification of fallen military personnel – represents an entirely novel normative question that the existing literature has not addressed from a legislative-design perspective. The present study seeks to fill both gaps.

■ Materials and Methods

The methodological basis of the research comprised a set of scientific methods selected in accordance with the nature of its object and subject. The comparative legal method was employed to juxtapose the legal systems of different states according to uniform criteria – specifically, the statutory basis for fingerprint registration, the categories of persons subject to registration, the conditions for data storage and deletion, and the available oversight mechanisms – thereby enabling the construction of the comparative table presented in the Results section. The formal legal method was applied in the analysis of normative legal acts and judicial decisions, including the Law of Ukraine "On Civil Service"[1], the Law of Ukraine "On the National Police"[2], Resolution No. 1214 of the Cabinet of Ministers of Ukraine[3], Article 9(2)(g) of the GDPR[4], the Grand Chamber judgment of the ECtHR in S. and Marper v. the United Kingdom[5], the judgment in Gaughran v. the United Kingdom[6], and the CJEU ruling in Case No. C-371/24[7]. The systemic method was used to examine the interconnections between the norms on personal data protection and the norms on public service, making it possible to identify the structural nature of the existing regulatory gap and to trace the consequences of that gap across different branches of national law.

The empirical basis of the research comprised: primary legislative and regulatory sources of Ukraine, the USA, the EU and its member states, Moldova, and Kazakhstan; the case law of the ECtHR and the CJEU; official statistics of the Unified Register of Persons Missing under Special Circumstances; and analytical reports of Ukrainian and international human rights organisations (Media Initiative for Human Rights, 2024; ZMINA, 2025). The study covered the period from 2003 (adoption of the Moldovan Law on State Dactyloscopic Registration) to 2026 (CJEU ruling in Case No. C-371/24[8]). Each normative source was assessed against the four-criterion compliance framework (lawful basis, legitimate aim, proportionality, and effective oversight) derived from the synthesis of ECtHR and CJEU case law, thereby ensuring methodological consistency across jurisdictions. The choice of comparative jurisdictions – the USA, EU member states (with a focus on the Netherlands), Moldova, and Kazakhstan – was determined by their representativeness of different approaches to fingerprint registration of public servants: a comprehensive mandatory model (USA), a differentiated model within the GDPR framework (EU), and post-Soviet legislative codification (Moldova, Kazakhstan)[9].

■ Results

Fingerprinting in the public administration system: Theoretical foundations. In the scholarly literature, a well-established distinction is drawn between fingerprinting according to its sphere of application: criminal registration (within criminal

[1] Law of Ukraine No. 889-VIII "On Civil Service". (2015, December). Retrieved from https://zakon.rada.gov.ua/laws/show/889-19.
[2] Law of Ukraine No. 580-VIII "On the National Police". (2015, July). Retrieved from https://zakon.rada.gov.ua/laws/show/580-19.
[3] Resolution of the Cabinet of Ministers of Ukraine No. 1214 "On the Approval of the Procedure for Implementing the Experimental Project on Identification of the Remains of Those Killed as a Result of the Armed Aggression of the Russian Federation Against Ukraine by Means of Biometric Data". (2025, September). Retrieved from https://legal100.org.ua/yak-teper-budut-identyfikovuvaty-zagyblyh-vijskovyh-postanova-km-ukrayiny-%E2%84%96-1214/.
[4] General Data Protection Regulation. (2016, April). Retrieved from https://eur-lex.europa.eu/eli/reg/2016/679/oj.
[5] Judgment of the European Court of Human Rights in the Case No. 30562/04 and 30566/04 "S. and Marper v. the United Kingdom". (2008, December). Retrieved from https://hudoc.echr.coe.int/fre?i=001-90051.
[6] Judgment of the European Court of Human Rights in the Case No. 45245/15 "Gaughran v. the United Kingdom". (2020, February). Retrieved from https://hudoc.echr.coe.int/fre?i=001-200817.
[7] Judgment of the Court of Justice of the European Union in Case No. C-371/24 "Comdribus". (2026, March). Retrieved from https://curia.europa.eu/site/upload/docs/application/pdf/2026-03/cp260039en.pdf.
[8] Ibidem, 2026.
[9] Judgment of the European Court of Human Rights in the Case No. 30562/04 and 30566/04 "S. and Marper v. the United Kingdom". (2008, December). Retrieved from https://hudoc.echr.coe.int/fre?i=001-90051.

proceedings) and administrative registration (outside criminal justice, in particular for the purposes of verifying persons upon entry to service, access control, and similar purposes). As noted by V. Zakharov & V. Rudeshko (2015), dactyloscopy is one of the fundamental instruments for the identification of a person by biometric data and stands at the intersection of forensic science, administrative law, and information law.

In the context of public service, fingerprinting performs three independent functions. The identification function consists in establishing the identity of a person and making it impossible to use forged documents. The preventive function is directed towards preventing the appointment to positions of persons with a criminal past, concealed connections, or a dual identity. The operational-security function provides access control to protected facilities and classified materials. This classification is important for distinguishing between the legal regimes governing the collection and use of the data obtained (Bidniak, 2017). From the standpoint of public administration theory, the introduction of fingerprinting fits within the concept of the "biometric state" – a state that systematically uses citizens' biological characteristics for administrative and security purposes. National Research Council (2010) draw attention to the fact that this tendency requires balancing against the principle of minimality of interference with private life and cannot be realised outside clear legislative frameworks.

Pursuant to the GDPR[1], biometric data that are subject to specific technical processing and enable the unambiguous identification of a natural person constitute a "special category" of personal data, the processing of which is in principle prohibited (Art. 9). The particular legal nature of fingerprint data is conditioned by their immutability – a papillary pattern cannot be "revoked" or replaced, unlike a password or document number – as well as by their potential link to criminal registers and the irreversibility of the consequences of their disclosure (Koops & Leenes, 2013). These characteristics distinguish fingerprint data from other categories of personal information and impose a correspondingly elevated standard of justification on any public authority seeking to collect and retain them.

The foregoing theoretical analysis warrants the following interim conclusions. First, fingerprinting in the context of public administration constitutes a distinct form of administrative biometric registration, functionally separate from criminal dactyloscopy: it serves identification, preventive, and operational-security functions and is oriented not toward establishing the facts of an offence, but toward ensuring the integrity and reliability of the public service. Second, fingerprint data fall within the category of biometric personal data subject to heightened protection under Article 9 GDPR, owing to their immutability, their potential link to criminal registers, and the irreversibility of harm in the event of unauthorised disclosure. Third, the tension identified by P. De Hert & A. Sprokkereef (2008) between biometric state practices and the principle of minimal interference with private life does not preclude administrative fingerprinting per se, but requires that any such measure be grounded in a clear statutory basis, pursue a legitimate aim, and satisfy the test of proportionality. These theoretical parameters define the analytical framework applied in the comparative assessment that follows.

International experience: A comparative legal analysis. The foundational legal reference point in the sphere of the protection of fingerprint data is the practice of ECtHR. Article 8 of the Convention for the Protection of Human Rights and Fundamental Freedoms[2] guarantees the right to respect for private and family life, which encompasses the protection of personal data, including biometric data. The key precedent is the Grand Chamber judgment in S. and Marper v. the United Kingdom[3]. The Court unanimously found a violation of Art. 8 of the Convention in connection with the indefinite retention of fingerprints and DNA profiles of persons subsequently acquitted. In Gaughran v. the United Kingdom[4] the ECtHR extended this position to persons with spent convictions, finding that the indefinite retention of their biometric data – in the absence of a differentiated approach that took account of the gravity of the offence and the genuine necessity of prolonged retention – was incompatible with Art. 8 of the Convention[5].

The ECtHR practice was further developed by the Court of Justice of the European Union in Case C-371/24[6]. Interpreting Art. 10 of Directive

[1] General Data Protection Regulation. (2016, April). Retrieved from https://eur-lex.europa.eu/eli/reg/2016/679/oj.
[2] Convention for the Protection of Human Rights and Fundamental Freedoms. (1950, November). Retrieved from https://www.echr.coe.int/documents/d/echr/convention_ENG.
[3] Judgment of the European Court of Human Rights in the Case No. 30562/04 and 30566/04 "S. and Marper v. the United Kingdom". (2008, December). Retrieved from https://hudoc.echr.coe.int/fre?i=001-90051.
[4] Judgment of the European Court of Human Rights in the Case No. 45245/15 "Gaughran v. the United Kingdom". (2020, February). Retrieved from https://hudoc.echr.coe.int/fre?i=001-200817.
[5] Ibidem, 2020.
[6] Judgment of the Court of Justice of the European Union in Case No. C-371/24 "Comdribus". (2026, March). Retrieved from https://curia.europa.eu/site/upload/docs/application/pdf/2026-03/cp260039en.pdf.

No. 2016/680/EU[1], the CJEU held that the collection of biometric data by competent authorities is permissible exclusively on condition of strict necessity and with a mandatory individual justification for each decision. National legislation making such collection systematic – without an individual assessment of strict necessity – is contrary to EU law.

A synthesis of ECtHR and CJEU practice makes it possible to identify four key principles: (1) a lawful basis in law; (2) a strictly necessary and legitimate aim; (3) proportionality; and (4) effective guarantees and review mechanisms. These principles constitute the minimum standard for any fingerprint registration regime for public servants. The United States represents an example of a state with a developed system of fingerprint checks for persons in public service. Every person entering federal civil service is obliged to provide fingerprints for a criminal background check through the FBI's Next Generation Identification (NGI) database (Federal Bureau of Investigation, 2023). The level of screening is differentiated by risk category (U.S. Department of the Interior, 2023). A system-forming element of the American model is the "Rap Back" continuous monitoring mechanism, under which the FBI promptly notifies the relevant authorities of new criminal records concerning already verified employees (Federal Bureau of Investigation, 2023). The American model thus combines mandatory biometric registration upon entry with continuous dynamic monitoring throughout the period of service.

In EU member states, approaches to the fingerprinting of public servants differ, but all are realised within the GDPR framework. Article 9(2)(g) GDPR provides for an exception to the general prohibition on the processing of biometric data in cases where such processing is necessary for reasons of substantial public interest on the basis of the legislation of a member state. The enforcement practice of the Netherlands is illustrative: the Dutch Data Protection Authority imposed on an employer a fine of EUR 725,000 for the mandatory scanning of employees' fingerprints, finding that the employer had failed to demonstrate either the existence of explicit consent or the impossibility of applying less invasive means of identification (datenshutz, 2020). This precedent illustrates the principled approach: mandatory fingerprint registration requires an unambiguous legislative authorisation and proof of proportionality.

Among post-Soviet states, Moldova adopted a separate Law on State Dactyloscopic Registration[2], which systematically defines the list of persons subject to mandatory fingerprinting, the principles of legality and confidentiality, and the guarantees for data protection. Kazakhstan adopted the Law on Dactyloscopic and Genomic Registration in 2016[3], providing for mandatory fingerprinting for persons entering service in law enforcement agencies. These examples demonstrate that even in states with transitional legal systems, special legislative regulation at the statutory level is recognised as necessary.

In the sphere of the armed forces, the American experience is particularly instructive: the U.S. Army introduced mandatory fingerprinting of recruits as early as 1905. Owing to preserved fingerprint records, all 45,952 Americans killed in Vietnam were identified (U.S. Office of Justice Programs, 1982). The current U.S. legislation[4] enshrines the mandatory collection of fingerprints upon entry into military service. In October 2022, the U.S. Secretary of the Army approved the first Army Biometrics Directive (U.S. Army, 2022). Within the NATO framework, the Automated Biometric Identification System (ABIS/NABIS) operates, providing for the exchange of biometric data between allies during joint operations (Loomis & Bowerman, 2025).

The comparative analysis of international practice yields the following interim conclusions. First, a synthesis of ECtHR and CJEU case law establishes four minimum quality requirements for any fingerprint registration regime: a lawful basis in statute, a strictly necessary and legitimate aim, proportionality, and effective oversight and review mechanisms. These requirements, whilst they set a high threshold, do not constitute an absolute prohibition on administrative fingerprinting of public servants. Second, the United States model – combining mandatory entry-level registration with continuous Rap Back monitoring – demonstrates the operational feasibility of comprehensive biometric verification of the public service workforce within a rule-of-law framework. Third, EU member states pursue a differentiated approach calibrated to the sensitivity of the position, utilising the public-interest exception under Article 9(2)

[1] Directive No. 2016/680 EU "On the Protection of Natural Persons with Regard to the Processing of Personal Data by Competent Authorities for the Purposes of the Prevention, Investigation, Detection or Prosecution of Criminal Offences or the Execution of Criminal Penalties, and on the Free Movement of Such Data, and Repealing Council Framework Decision 2008/977/JHA". (2016, April). Retrieved from https://eur-lex.europa.eu/eli/dir/2016/680/oj/eng.

[2] Law of the Republic of Moldova No. 1549-XV "On State Dactyloscopic Registration". (2003, February). Retrieved from https://www.ecoi.net/en/file/local/1027471/1504_1217232004_law-of-the-republic-of-moldova-on-state-dactyloscopic-registration.pdf.

[3] Law of the Republic of Kazakhstan No. 40-IV "On Dactyloscopic and Genomic Registration". (2016, December). Retrieved from https://adilet.zan.kz/eng/docs/Z1600000040.

[4] 8 U.S. Code § 1440f "Fingerprints and Other Biometric Information for Members of the United States Armed Forces. Legal Information Institute". (2008, June). Retrieved from https://www.law.cornell.edu/uscode/text/8/1440f.

(g) GDPR; the Dutch enforcement practice confirms that mandatory registration requires unambiguous legislative authorisation and proof of proportionality in each case. Fourth, the post-Soviet experience of Moldova (2003) and Kazakhstan (2016) illustrates that statutory codification of biometric registration regimes is achievable even in transitional legal systems. Fifth, and most significantly for the purposes of this article, none of the examined jurisdictions has left the matter unregulated at the legislative level – a gap that, as the following section demonstrates, remains Ukraine's defining characteristic.

Legal regulation in Ukraine: A systemic analysis. Ukrainian legislation does not provide for fingerprinting as a condition of entry into public service for any category of servant. The Law of Ukraine "On Civil Service"[1], in determining the conditions of entry into civilian civil service, contains no provision for the collection of biometric data. The Law of Ukraine "On the National Police"[2], in establishing the requirements for candidates for service (Art. 49) and the procedure for verifying a candidate (Art. 50), similarly does not provide for fingerprinting upon entry. For military personnel, the corresponding statutory norm is also absent.

The existing subordinate regulatory acts in the sphere of dactyloscopy regulate exclusively the fingerprinting of detained, suspected, and convicted persons within the framework of criminal registers, but not of servants upon entry. As Knyzhenko and Sharaban (2023) note, the rules governing the collection, storage, use, and destruction of biometric data are elaborated only in subordinate normative acts, between which there are significant contradictions, and many questions remain unresolved at the legislative level. The entire normative basis in the sphere of fingerprinting in Ukraine relates exclusively to persons in conflict with the law, not to persons entering the ranks of the public service.

The nearest functional analogue of a fingerprint check in the national system is the institution of special verification conducted by the National Agency on Corruption Prevention (NACP). However, it differs fundamentally from biometric identification verification: it is conducted primarily on the basis of documents provided by the person concerned; it relies on a name-based check, not on biometric identification; and it does not cover verification of the identity of the person from the perspective of the correspondence of the documents presented. The absence of a biometric element leaves a systemic risk – the use of forged documents or multiple identities upon entry to public service – that is particularly significant given the established practice of the penetration of foreign intelligence agents into organs of state authority.

Russia's full-scale armed aggression made especially acute the problem of identification of the fallen. Resolution No. 1214 of the Cabinet of Ministers of Ukraine[3] approved the Procedure for Implementing the Experimental Project on Identification of the Remains of Those Killed by Biometric Data, providing for the voluntary fingerprinting of living military personnel for the purposes of post-mortem identification. On 4 December 2025, the Verkhovna Rada approved in the first reading Draft Law No. 14095[4], providing for the use of digitised fingerprints for the identification of the remains of the fallen (ZMINA, 2025). Forensic experts note a fundamental inconsistency: dactyloscopy has not yet been recognised in Ukraine as an independent method of identification, and the identification of the fallen is conducted primarily through DNA analysis, which may take up to fourteen months (MIHR, 2024). As of early 2026, more than 90,000 persons were considered missing in connection with the war.

The question of introducing mandatory fingerprinting of civil servants had already been considered in Ukraine in 2012, when a corresponding draft law[5] was submitted to the Verkhovna Rada. The draft law did not receive legislative realisation, inter alia owing to the absence of an informed-consent mechanism and a clear legal distinction between criminal and administrative registration. This experience underscores the need for the correct positioning of biometric registration as an administrative, not a criminal, instrument. The comparative characteristics of legal regulation across the examined jurisdictions are summarised in Table 1. The comparative data presented in Table 1 permit the following interim conclusions regarding the international regulatory landscape. First, the existence of a comprehensive statutory framework for the biometric registration of public servants is the norm, not the exception, in the jurisdictions examined: the

[1] Law of Ukraine No. 889-VIII "On Civil Service". (2015, December). Retrieved from https://zakon.rada.gov.ua/laws/show/889-19.
[2] Law of Ukraine No. 580-VIII "On the National Police". (2015, July). Retrieved from https://zakon.rada.gov.ua/laws/show/580-19.
[3] Resolution of the Cabinet of Ministers of Ukraine No. 1214 "On the Approval of the Procedure for Implementing the Experimental Project on Identification of the Remains of Those Killed as a Result of the Armed Aggression of the Russian Federation Against Ukraine by Means of Biometric Data". (2025, September). Retrieved from https://legal100.org.ua/yak-teper-budut-identyfikovuvaty-zagyblyh-vijskovyh-postanova-km-ukrayiny-%E2%84%96-1214/.
[4] Draft Law of Ukraine No. 14095 "On Amendments to Certain Legislative Acts of Ukraine Regarding the Identification of Persons Missing under Special Circumstances". (2025, December). Retrieved from https://itd.rada.gov.ua/billInfo/Bills/Card/45478.
[5] Draft Law of Ukraine "On the Identification of a Person by Means of Fingerprinting". (2012, December). Retrieved from https://ips.ligazakon.net/document/GF7IC00A.

USA, EU member states, Moldova, and Kazakhstan have all enacted primary legislation governing the conditions, scope, and oversight of fingerprint data collection in the public administration context. Second, the differentiated approach – calibrating the intensity of biometric registration requirements to the sensitivity of the position – has emerged as the dominant regulatory model across EU member states, balancing legitimate public-interest objectives against the enhanced protection that Article 9 GDPR requires for biometric data. Third, the continuous monitoring mechanism (Rap Back) implemented in the United States demonstrates that biometric registration is not a one-time event at the point of entry to service, but may extend to the duration of the employment relationship where national security considerations so require. Fourth, the stark contrast between the regulatory completeness of all examined foreign jurisdictions and the complete absence of any statutory framework in Ukraine confirms the characterisation advanced in the preceding analysis: the Ukrainian legal vacuum is not a matter of degree but of kind. Fifth, the table also reveals that the protective guarantees accompanying registration – data retention limits, independent oversight, rights of access and erasure – are constitutive elements of lawful registration regimes, not optional additions; their absence in any future Ukrainian framework would render it incompatible with ECtHR and CJEU standards from the outset.

Table 1. Comparative characteristics of the legal regulation of fingerprinting of public servants

Criterion	USA	EU member states (majority)	Ukraine
Legislative basis	Privacy Act 1974[1]; OPM regulations; 8 U.S.C. § 1440f[2]	GDPR[3] Art. 9(2)(g) + special laws of member states	Absent for public servants
Fingerprinting of civil servants upon entry	Mandatory for all federal servants	Differentiated by security clearance level	Not provided for by any act
Fingerprinting of police and security personnel upon entry	Mandatory	Mandatory in the majority of member states	Not provided for by any act
Fingerprinting of military personnel upon entry	Mandatory (since 1905; hiatus 1974-1990s)	Regulated by national legislation	Voluntary, exclusively for identification purposes (from Sept. 2025)
Continuous monitoring (Rap Back)	Yes (FBI NGI Rap Back)	Limited; varies by member state	Absent
Data retention period	Extended, pursuant to Privacy Act	Limited; right to erasure (GDPR)	Not regulated for servants
Protective guarantees	Privacy Act, CJIS Security Policy	GDPR, independent data protection authorities, ECtHR	Fragmentary; primarily subordinate MIA acts

Source: compiled by the authors on the basis of the sources cited

Discussion

The established legal vacuum in the sphere of fingerprint registration of public servants in Ukraine is not merely a technical shortcoming – it is a structural vulnerability of the public administration integrity system. Verification of a person's identity upon entry to service through a name-based check is a fundamentally less reliable mechanism in comparison with biometric identification, since it does not exclude the possibility of the use of forged documents, substitution of identity, or concealment of a criminal past through a change of identifying data. In this context, the conclusion of S. Knyzhenko & O. Sharaban (2023) that the legal norms in the sphere of the collection of biometric data "contain many contradictions" and "many questions remain unresolved at the legislative level" acquires a qualitatively broader significance – as a characterisation not only of the criminalistic systems of the MIA, but of the public servant verification system as a whole.

The approach to the problem through the prism of an apparent incompatibility of security needs and GDPR requirements is doctrinally erroneous. The construction of Art. 9(2)(g) GDPR directly provides for the processing of biometric data in cases where it is necessary for reasons of substantial public interest on the basis of the legislation of a member state. Thus, the GDPR does not prohibit mandatory fingerprinting of public servants – it establishes quality standards for such regulation. These standards require: a clear legislative basis; a defined and proportionate aim; individual justification in each specific case; a limited retention period; and an effective review mechanism. Under these conditions,

[1] Privacy Act of 1974, 5 U.S.C. § 552a. (1974, December). Retrieved from https://www.govinfo.gov/content/pkg/USCODE-2018-title5/pdf/USCODE-2018-title5-partI-chap5-subchapII-sec552a.pdf.
[2] 8 U.S. Code § 1440f "Fingerprints and Other Biometric Information for Members of the United States Armed Forces. Legal Information Institute". (2008, June). Retrieved from https://www.law.cornell.edu/uscode/text/8/1440f.
[3] General Data Protection Regulation. (2016, April). Retrieved from https://eur-lex.europa.eu/eli/reg/2016/679/oj.

mandatory fingerprinting of public servants, properly enshrined in statute, meets the proportionality principle, provided that a differentiated approach is applied correlating requirements with the level of official powers, access to confidential information, and the potential risk of abuse.

The general GDPR-compatible framework for biometric data processing, yet their analyses predate the CJEU ruling in Comdribus[1], which materially tightens the individual-justification requirement for each data-collection decision. S. Knyzhenko & O. Sharaban (2023) identified internal contradictions within Ukraine's MIA dactyloscopic registers but confined their analysis to the criminal context; the present Article demonstrates that the same structural deficiency extends to the entire public administration verification system. B. Loomis & K. Bowerman (2025) documented NATO's operational biometric capabilities without addressing the national legislative vacuum that makes Ukraine's military identification crisis particularly acute. The MIHR (2024) and ZMINA (2025) reports provide empirical grounding for the legislative urgency established here. Unlike prior scholarship, the present study synthesises the administrative-law, human rights, and wartime-identification dimensions into a unified conceptual framework oriented toward a concrete legislative proposal.

The practice of applying fingerprinting in Ukraine exclusively in the criminal context forms a stable association of this procedure with suspicion of the commission of a crime. The failure of the 2012 draft law[2] demonstrates that the absence of a conceptual distinction between criminal and administrative dactyloscopy is a real factor of social resistance. Overcoming this barrier requires: a clear normative distinction between the two forms of registration; transparent legislative entrenchment of the aims and guarantees; and active public legal awareness work. It is noteworthy that a change in social perception is already occurring in the context of the identification of the fallen: Resolution No. 1214[3] and Draft Law No. 14095[4] were met with public support – because their aim is clearly formulated and understandable (ZMINA, 2025).

The introduction of a system of fingerprinting of public servants requires technical readiness that is as of 2026 insufficient. The existing system of automated fingerprint records of the MIA requires technical improvement and legal regulation, and the MIA databases contain cases of improper deletion of information (Knyzhenko & Sharaban, 2023). The introduction of a new system will require the modernisation of fingerprint collection equipment, improvement in the cyber-protection of databases, establishment of inter-agency information exchange, and personnel training. An existing potential is available: the State Migration Service of Ukraine retains the digitised fingerprints of the thumbs of approximately 35 million citizens, collected during the processing of foreign travel passports – this infrastructure is already being used for the identification of the fallen and may form the basis for a broader system.

The foregoing discussion warrants the following interim conclusions regarding the practical and normative challenges of introducing biometric registration in Ukraine. First, the perception of fingerprinting as exclusively a criminal-law instrument constitutes the principal socio-legal barrier to reform and must be overcome through explicit statutory differentiation between criminal and administrative registration regimes. Second, the failure of the 2012 draft law demonstrates that legislative proposals in this sphere require not only technical legal drafting but also a clearly articulated public justification grounded in identified administrative objectives rather than security rhetoric. Third, the existing biometric infrastructure of the State Migration Service – retaining the digitised fingerprints of approximately 35 million Ukrainian citizens – represents a ready-made technical foundation that significantly reduces the resource cost of implementing a broader registration regime. Fourth, the technical shortcomings of the current MIA dactyloscopic records system (internal contradictions, improper deletions, absence of inter-agency data exchange protocols) must be addressed as a prerequisite condition, rather than a concurrent undertaking, of any legislative expansion. Fifth, the wartime identification dimension – already partially addressed by Resolution No. 1214[5] and Draft Law No. 14095[6] – provides both a normative precedent and a compelling public justification for the adoption

[1] Judgment of the Court of Justice of the European Union in Case No. C-371/24 "Comdribus". (2026, March). Retrieved from https://curia.europa.eu/site/upload/docs/application/pdf/2026-03/cp260039en.pdf.
[2] Draft Law of Ukraine "On the Identification of a Person by Means of Fingerprinting". (2012, December). Retrieved from https://ips.ligazakon.net/document/GF7IC00A.
[3] Resolution of the Cabinet of Ministers of Ukraine No. 1214 "On the Approval of the Procedure for Implementing the Experimental Project on Identification of the Remains of Those Killed as a Result of the Armed Aggression of the Russian Federation Against Ukraine by Means of Biometric Data". (2025, September). Retrieved from https://surl.li/jggfhi.
[4] Draft Law of Ukraine No. 14095 "On Amendments to Certain Legislative Acts of Ukraine Regarding the Identification of Persons Missing under Special Circumstances". (2025, December). Retrieved from https://itd.rada.gov.ua/billInfo/Bills/Card/45478.
[5] Resolution of the Cabinet of Ministers of Ukraine No. 1214 "On the Approval of the Procedure for Implementing the Experimental Project on Identification of the Remains of Those Killed as a Result of the Armed Aggression of the Russian Federation Against Ukraine by Means of Biometric Data". (2025, September). Retrieved from https://surl.li/jmwxin.
[6] Draft Law of Ukraine No. 14095 "On Amendments to Certain Legislative Acts of Ukraine Regarding the Identification of Persons Missing under Special Circumstances". (2025, December). Retrieved from https://itd.rada.gov.ua/billInfo/Bills/Card/45478.

of a comprehensive statutory framework, demonstrating that the social perception of biometric registration is already evolving in Ukraine in the direction required for broader reform.

Conclusions

The comparative legal analysis conducted in this Article warrants the following conclusions. In leading democracies – the USA and EU member states – mandatory fingerprinting of public servants upon entry to service is an established instrument implemented on a statutory basis, in compliance with proportionality and personal data protection standards. The American model combines mandatory entry-level biometric registration with continuous Rap Back monitoring; the EU model applies a differentiated approach calibrated to the sensitivity of the position.

Ukraine has no statutory provision for fingerprinting of civil servants, police officers, or military personnel upon entry to service. The entire national dactyloscopic normative framework is confined to the criminal context. This gap constitutes a structural vulnerability of the public administration integrity system, with practical consequences including the risk of identity fraud, concealment of disqualifying backgrounds, and – in the wartime context – the inability to rapidly identify fallen military personnel by biometric means.

The ECtHR standards (S. and Marper, Gaughran) and the CJEU standard (Case C-371/24) do not prohibit mandatory fingerprinting of public servants. They impose four quality requirements: a statutory basis, a specific and proportionate aim, a limited data retention period, and an effective review mechanism. A properly designed Ukrainian law can satisfy all four requirements simultaneously. Russia's full-scale armed aggression has given the fingerprinting question a critical wartime dimension. Resolution No. 1214 of the Cabinet of Ministers and Draft Law No. 14095 represent first normative steps, but the voluntary character of registration and the non-recognition of dactyloscopy as an independent identification method remain systemic shortcomings requiring legislative resolution. The primary legislative step is the adoption of a Law of Ukraine "On Biometric Registration" establishing: a closed list of positions subject to mandatory fingerprinting; proportionality-based differentiation of requirements by risk category; clear rules on data retention and access; an independent oversight mechanism; and a phased implementation timeline compatible with the existing State Migration Service biometric infrastructure.

The prospects for further research lie in the development of a draft conceptual model for such a law, drawing on the legislative experience of EU member states that have implemented differentiated biometric registration regimes within the GDPR framework, and in an empirical assessment of the technical readiness of Ukrainian institutions for phased implementation.

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Conflict of Interest

None.

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Біометрична реєстрація державних службовців: між державною безпекою та правом на приватність

Микола Комiссаров
Кандидат юридичних наук, доцент
Центр внутрішньої безпеки спеціального призначення «Гард»
Національної гвардії України
03151, вул. Святослава Хороброго, 9А, м. Київ, Україна
https://orcid.org/0000-0001-6828-7974
Наталя Комiссарова
Кандидат юридичних наук, доцент
Київський інститут Національної гвардії України
03180, вул. Оборони Києва, 7, м. Київ, Україна
https://orcid.org/0000-0001-6895-6891

■ **Анотація.** Статтю присвячено правовому регулюванню обов'язкового дактилоскопіювання державних службовців як механізму верифікації особи, забезпечення доброчесності та безпеки публічного управління. На основі порівняльно-правового та формально-юридичного методів проаналізовано законодавство України, держав-членів Європейського Союзу та Сполучених Штатів Америки щодо збирання й оброблення дактилоскопічних даних осіб, які обіймають або претендують на посади публічної служби. Систематизовано практику Європейського суду з прав людини у справах S. and Marper v. United Kingdom, Gaughran v. United Kingdom та рішення Суду справедливості Європейського Союзу у справі C-371/24 Comdribus. За результатами встановлено, що в Україні дактилоскопіювання під час вступу на публічну службу не передбачене жодним нормативно-правовим актом – ні для цивільних службовців, ні для поліцейських, ні для військовослужбовців, – що становить структурну вразливість системи доброчесності публічного управління. Підхід, відповідно до якого GDPR забороняє таку реєстрацію, визнано доктринально хибним: ст. 9(2)(g) GDPR прямо допускає обробку біометричних даних з мотивів суттєвого суспільного інтересу за наявності належної законодавчої основи. Обґрунтовано диференційовану модель запровадження дактилоскопіювання відповідно до стандартів Європейського суду з прав людини, Суду справедливості Європейського Союзу та GDPR. Виявлено специфічний вимір проблеми – ідентифікацію загиблих військовослужбовців – та запропоновано його нормативне вирішення. Сформульовано висновок, що ухвалення Закону України «Про біометричну реєстрацію» з диференційованим підходом до категорій посад, чіткими гарантіями захисту персональних даних і поетапним запровадженням є першочерговим законодавчим кроком

■ **Ключові слова:** біометрична реєстрація; захист персональних даних; доброчесність державної служби; право на приватність; ідентифікація загиблих

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Problems of international legal mechanisms for control over nuclear and radiological materials

Iryna Les*
PhD in Law, Associate Professor
National Academy of Internal Affairs
03035, 1 Solomianska Sq., Kyiv, Ukraine
https://orcid.org/0000-0003-0596-3749

■ **Abstract.** The purpose of this study was to investigate the problem of international legal mechanisms for controlling nuclear and radioactive materials. The paper used the formal legal method as the basic one, since it allows analysing legal norms, structures, and concepts. The study showed that the non-proliferation of nuclear weapons and weapons-grade nuclear materials was based mainly on the Treaty on the Non-Proliferation of Nuclear Weapons of 1968, which established strict rules for the use of civilian nuclear materials and technologies worldwide and was monitored by the International Atomic Energy Agency in Vienna. However, with the growth of the activity of international terrorist organisations in recent years, the current provisions on nuclear non-proliferation have proven to be imperfect and inadequate. The study stressed that security policies and civil defence should be based on the fact that terrorist organisations seek to obtain nuclear materials for attacks. Nuclear terrorism is widespread because the Non-Proliferation of Nuclear Weapons does not require its member states to protect nuclear materials and facilities from theft or terrorist sabotage. In fact, at the international level, the physical protection of nuclear weapons materials and civilian nuclear facilities (reactors, interim storage facilities, and fuel rod fabrication and reprocessing plants) varies considerably. Many countries do not have adequate protection for the transport, reprocessing, interim storage and disposal of usable and spent nuclear fuel, leading to loss, theft, smuggling, and illegal international trade in these materials. The practical significance of this issue lies in the fact that the analysis of the problems of international legal mechanisms for the control of nuclear and radioactive materials helps to assess the shortcomings of existing mechanisms and eliminate them, thereby ensuring the highest level of safety and control of nuclear and radioactive materials

■ **Keywords:** Treaty on the Non-Proliferation of Nuclear Weapons; nuclear weapons; security policy; terrorist threats; radioactive materials

■ Introduction

In conditions when a war is being waged on the territory of the independent state of Ukraine, and its 4 nuclear power plants with WWER type reactors: Zaporizhzhia, Rivne, Khmelnytskyi, and South Ukraine, which operate 15 nuclear power plants with a total installed capacity of 13,835 MW (Sharaevsky *et al.*, 2022), are under threat of destruction or capture by the aggressor army. The problem of ensuring international control over nuclear and radiological materials should come to the fore. Such a challenge to security policy makes the issues of protection and radiation control of active sources used for civilian purposes in industry, research, and medicine around the world particularly pressing. Although radioactive sources are not suitable for the production of nuclear weapons, improper handling of them and some radiation protection measures can cause significant harm to people and the environment. Due to inadequate

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■ *Corresponding author (*advokatles@gmail.com*)

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regulations for the protection and security of radioactive sources in some countries, there is a risk that criminals and terrorists could use these materials as radioactive weapons.

Under the influence of current international conflicts and the threat of terrorism, the scope of nuclear arms control policy has expanded from its original focus on preventing the proliferation of nuclear weapons to encompass the security and control of all nuclear technologies, including industrial and medical radiation technologies. This new responsibility has also had a significant impact on national internal security functions such as preventing technological hazards (radiation protection, disaster relief) and preventing crime.

For many years, the International Atomic Energy Agency (IAEA) has been working to strengthen and regulate the transport of nuclear and radioactive materials around the world, to monitor and account for existing facilities, and to implement border and security controls. However, it has proven difficult to fully expand the negotiating positions focused on the Treaty on the Non-Proliferation of Nuclear Weapons[1] (NPT) and its monitoring mechanisms, including the implementation of a comprehensive system for the implementation of the nuclear agreement. Therefore, other, more innovative regulatory instruments and non-standard approaches are required. The study by M. Elbaradei (2021) emphasised the key role of international institutions in supporting the nuclear non-proliferation regime and controlling the use of nuclear materials. P. Goldschmidt (2021) emphasised the need to strengthen international monitoring and introduce stricter procedures for verifying compliance with nuclear safety obligations.

The planned extension of the 1980 Convention on the Physical Protection of Nuclear Material[2] relies entirely on the own responsibility of the Member States, and the effectiveness of the agreement depends on the direct own interests of the Member States. In addition, the absence of treaty obligations is a distinctive feature of the new international rules governing the control of materials. These regulations have been replaced by non-binding guidelines, technical safety standards and agreements on the physical protection of radioactive sources, such as the IAEA Code of Conduct (in force since 2000) on the Safety and Security of Radioactive Sources[3]. One of the objectives of the new regulations is to incorporate minimum standards of physical protection and nuclear security into national legislation and to harmonise national security measures at the international level.

Thus, the safeguards in international agreements to prevent the use of nuclear and radioactive materials for terrorism are less restrictive than traditional nuclear arms control measures. However, as stated by A. Zamula *et al.* (2025), the relevant regulations contain important minimum legal requirements and implementation details, responsibilities, obligations, and technical safety standards of regulatory authorities. Thus, the task of preventing nuclear terrorism is clearly defined and becomes a manageable issue within the framework of international security policy.

This new approach offers significant practical advantages and can be applied to Ukrainian security legislation. Even assuming that the current Ukrainian security strategy can be easily compared with the national defence strategy of other countries, the traditional technical solutions to the proliferation and use of weapons that weaken Ukraine's security cannot be ignored. As a result, Ukrainian security policy depends on a broader international consensus. However, according to V. Khalimonchuk *et al.* (2025), although Ukraine has significant resources, its energy infrastructure remains unstable and vulnerable. Specific tools to effectively meet national and international needs include:

- Ukrainian partnerships (technical, advisory, and financial) in cooperation and multilateral security activities;
- cooperation between Ukrainian business and research institutions, including specialised project organisations and clients in the field of nuclear and radiological security;
- strengthening Ukrainian consultative, support and coordination mechanisms between current and future EU research and security systems, drawing on its own defence policy, security standards and technical and scientific expertise.

For decades, limited, tightly controlled access to fissile nuclear material has been considered an essential measure against the international proliferation of nuclear weapons. This barrier was essentially established by the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) of 1968[4]. Its enforcement today relies on a comprehensive international regulatory framework developed over decades, consisting of contractual monitoring and verification measures

[1] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.
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(safeguards). These measures are coordinated, implemented, and evaluated worldwide by the International Atomic Energy Agency (IAEA).

However, with the end of the Cold War, the political and technical requirements for the control of nuclear weapons have changed significantly in several respects. International clandestine armies and terrorist organisations are now a key challenge for security policy, as noted by I. Les (2024). Their goals and activities, if not hinting at them, at least raise the fear that they are seeking to acquire nuclear weapons. However, since only states, not non-state organisations, are parties to the NPT, non-state actors in international politics are not subject to the technical and procedural standards of nuclear control and the provisions of the treaties. The purpose of this study was to examine the issue of international legal mechanisms for the control of nuclear and radioactive materials.

Materials and Methods

This study used a combination of general scientific and specialised legal research methods. The main method was formal legal analysis, the priority of which was given to the provisions of international law and the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)[1] relating to the provision of international legal mechanisms for the control of nuclear and radiological materials, and documents, projects, and recommendations issued by the IAEA and individual states within the framework of bilateral cooperation. The comparative legal method was also used to investigate approaches to solving the problem of ensuring security policy in various regulatory legal acts and by various participating states. This included an analysis of national doctrines and international conventions such as the IAEA Safeguards[2], the Additional Protocol to the Safeguards Agreements in force[3], the International Basic Standards for Protection against Ionising Radiation and the Safety of Radiation Sources (ISRS)[4], the Convention on Nuclear Safety[5], the Convention on the Safety of Spent Fuel and Radioactive Waste[6], etc. The results were interpreted using a normative and analytical approach, according to which each observed fact or argument was assessed for compliance with applicable international legal norms. This interdisciplinary methodology, located at the intersection of international law, security, and technology, can be used to develop well-founded conclusions and policy recommendations.

The case study method was used to examine real incidents related to events that occurred in the 1990s, when it became known that Iraq and North Korea had nuclear weapons development programmes that violated the treaties, and the IAEA monitoring regime was incomplete. This conclusion was confirmed again when in early 2004 it became known about the pronounced nature of Pakistan's nuclear weapons proliferation. Back in 1997, the IAEA developed an Additional Protocol[7] to the existing safeguards agreements, which by July 2003 had been signed by 74 states, including Ukraine, and had entered into force for 35 states. It granted IAEA inspectors rights of access to information and verification that were broader than those granted under the original safeguards agreement. All sources were used in a multi-level analysis of the legal framework underlying the security of nuclear and radiological materials, exposing the risks associated with the operation of nuclear power plants, uranium enrichment, etc.

Results

Since the late 1990s, the International Atomic Energy Agency has been working to strengthen and regulate the physical protection of global radioactive sources, monitor, and account for existing radioactive sources, and implement border and export controls (Les, 2023). Initially, these efforts focused on improving protection against accidents and radiation disasters, but after the terrorist attacks of September 11, 2001 in New York, the main driving force shifted to the fight against terrorism.

The long-term goal of the International Atomic Energy Agency is to have strict and unified international control over the entire life cycle of radioactive sources, from production and use to final disposal, which

[1] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.
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[6] Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. (1997, September). Retrieved from https://www.iaea.org/topics/nuclear-safety-conventions/joint-convention-safety-spent-fuel-management-and-safety-radioactive-waste.
[7] IAEA Safeguards the Additional Protocol to the Safeguards Agreements in Force. (1997, May). Retrieved from https://zakon.rada.gov.ua/laws/show/951_002#Text.

is of paramount importance. This study suggests that, under the influence of new international conflicts and threats, the mission of arms control policy, originally aimed at preventing the proliferation of nuclear weapons, has expanded to a comprehensive mission of protection and control, covering all nuclear technologies, including industrial and medical radiology. This expanded mission has profound implications for the responsibilities of states in the field of ensuring internal security, such as the prevention of technological hazards (radiation protection, disaster relief) and the prevention of crime. No state can delegate its responsibilities to an international body such as the IAEA, even considering the threat of terrorism, this mission largely corresponds to the main issues of international security (Silva, 2026).

Of particular concern is whether the traditional international regulatory system for nuclear safety is sufficiently comprehensive. Since the main components are the Treaty on the Non-Proliferation of Nuclear Weapons[1] and the IAEA Safeguards[2], it is also questionable whether international arms control agreements can adequately cover physical protection and control of non-fissile materials.

This study focuses on two routes to international arms control agreements: treaty and non-treaty. Through treaties such as the Treaty on the Non-Proliferation of Nuclear Weapons[3], partner states can assume legally binding obligations. Alternatively, partner states can mutually commit to providing services but are not obligated to perform those services; they can simply agree on guidelines or recommendations. From the perspective of all stakeholders, the negative consequences of not adhering to such guidelines or recommendations are less serious than the consequences of violating treaty provisions. Such agreements do not require complex ratification procedures and implementation provisions, and certainly no monitoring or verification. However, specific ways of controlling materials and their respective advantages are considered below.

It is quite predictable that due to the complexity and practically limitless nature of this problem, possible regulatory measures will always offer only more or less promising solutions and, at best, will achieve success only in the long term. On the other hand, control of radioactive sources also has advantages over traditional non-proliferation measures of nuclear weapons, which international security policy can systematically use[4]. In addition to the question of what the outlined contractual and non-contractual regulations can achieve and where their limitations may be, questions arise about the need for action, opportunities for global security policy. This study proceeds from the fact that in order to protect against a specific terrorist attack using nuclear or radiological weapons, Ukraine can and should further improve its security infrastructure (physical protection of equipment and facilities, training of security personnel, civil defence, and disaster relief) (Flynn, 2024).

However, this study also indicates that the risk of nuclear and radiological proliferation, which poses a significant threat to Ukraine's security, depends less on Ukraine's own internal security measures than on the non-proliferation actions of other countries. Nuclear and radiological non-proliferation should be viewed as a chain of international agreements and measures, the strength of which depends on the weakest link. In this respect, Ukraine's security still depends on a broad international decision-making process and its effectiveness. Based on this premise, this paper assessed the need for action, the appropriateness of security policies, and the applicability of existing treaty and non-treaty international material control mechanisms. The Treaty on the Non-Proliferation of Nuclear Weapons[5] (NPT) is, first and foremost, an arms control treaty aimed at preventing the proliferation of nuclear weapons (Preamble, Articles I–III). In practice, this treaty represents an accounting and monitoring agreement for weapons-grade or enriched nuclear material normally held by non-nuclear-weapon states for peaceful purposes (Article III).

The International Atomic Energy Agency (IAEA) monitors these materials in non-nuclear-weapon states using established monitoring measures, namely, the aforementioned safeguards and surveillance. This is based on information provided by non-nuclear-weapon states to the IAEA on the type and quantity of their civilian nuclear material. The Vienna Convention on Civil Liability for Nuclear Damage[6] is responsible for accounting for the production, consumption

[1] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.
[2] IAEA Safeguards the Additional Protocol to the Safeguards Agreements in Force. (1997, May). Retrieved from https://zakon.rada.gov.ua/laws/show/951_002#Text.
[3] Ibidem, 1997.
[4] Order of the Ministry of Ecology and Natural Resources of Ukraine No. 241 "On Approval of the Rules for Ensuring the Safety of Nuclear Materials, Radioactive Waste, and Other Sources of Ionizing Radiation". (2000, December). Retrieved from https://zakon.rada.gov.ua/laws/show/z0013-01#Text.
[5] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.
[6] Vienna Convention on Civil Liability for Nuclear Damage. (1963, May). Retrieved from https://zakon.rada.gov.ua/laws/show/2893-14#Text.

and location of declared quantities. The accounting and reporting requirements are designed to prevent the diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices (Article III, paragraph 1). In addition, under Article III, paragraph 2, all contracting parties are obliged to transfer fissile material and technical equipment necessary for its reprocessing to other states only on condition that these states comply with the safeguards and monitoring provided for in the Treaty on the Non-Proliferation of Nuclear Weapons[1].

Since the signing of the Treaty on the Non-Proliferation of Nuclear Weapons in 1968[2], the International Atomic Energy Agency has implemented the necessary monitoring measures with Member States and groups of countries by concluding a number of supplementary agreements and has published these measures in its announcements (information, circulars, verification notices and notifications to the Verification Information Centre, etc.). As the responsible verification agency, the IAEA focuses its activities on verifying the accuracy and completeness of information provided by Member States on their nuclear programmes (production, use, and storage locations of fissile material), and on increasing the confidence of the NPT States Parties in the peaceful use of nuclear weapons by their partner states or on promptly providing empirical evidence to confirm suspicions of treaty violations (early warning) (Zubair *et al.*, 2024). In particular, these measures include: analysis and verification of reports and data submitted by Member States through inspections of nuclear facilities and nuclear material stockpiles of Member States (surveillance, surprise, periodic and other inspections carried out by IAEA officials), sealing of containers protected from unauthorised access, and installation and maintenance of surveillance cameras. In the 1990s, after the nuclear weapons development programmes of Iraq and North Korea (Tereshchenko, 2020) were exposed in violation of treaty provisions, it was found that the International Atomic Energy Agency's surveillance mechanisms were not sufficiently effective. In early 2004, the seriousness of Pakistan's nuclear proliferation was further confirmed (Azad & Shahid, 2021). As early as 1997, the IAEA developed an Additional Protocol[3] to the existing safeguards agreements. As of July 2003, 74 countries, including Ukraine, had signed the Protocol, of which 35 had entered into force. This Protocol gave IAEA inspectors broader information and verification powers than the original safeguards agreements. For example, the 1973 agreement (in force since 1977) between the IAEA, EURATOM and various European states, including Ukraine, under INFCIRC/193[4]. The arms control mechanism under the Treaty on the Non-Proliferation of Nuclear Weapons was significantly expanded. A key aspect of the new provisions was that the International Atomic Energy Agency was no longer limited to inspecting declared materials, nuclear facilities, and civilian activities of member states. Instead, it was authorised to actively and almost without restriction investigate undeclared materials and clandestine nuclear programmes on the territory of the inspected state, subject to disagreements or in extraordinary circumstances, even if a treaty violation is suspected. In addition, IAEA inspectors are also authorised to use the most advanced measurement and communication technologies for their inspections.

The arms control provisions of the Treaty on the Non-Proliferation of Nuclear Weapons are complemented by a large number of technical regulations, standards, and recommendations of the International Atomic Energy Agency, covering the safe handling of nuclear materials at every stage, from use and transportation to processing, storage, and disposal. These include, among others:

- International Basic Standards for Protection against Ionising Radiation and the Safety of Radiation Sources[5]. These contain recommendations on protection against nuclear radiation, which the IAEA has been developing since the early 1960s together with the International Commission on Radiological Protection and which are constantly being adapted to new requirements.
- Convention on Nuclear Safety of 1994[6]. This agreement aims to achieve and maintain a high level of global nuclear safety through the improvement of national measures and international cooperation,

[1] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.
[2] Ibidem, 1968.
[3] Additional Protocol to the Existing Safeguards Agreements. (1997, May). Retrieved from https://www.iaea.org/topics/additional-protocol
[4] Additional Protocol to the Agreement between Ukraine and the International Atomic Energy Agency on the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons. (2000, September). Retrieved from https://zakon.rada.gov.ua/laws/card/951_002.
[5] International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. (1996, September). Retrieved from https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_protect/@protrav/@safework/documents/publication/wcms_152685.pdf.
[6] Convention on Nuclear Safety. (1994, June). Retrieved from https://www.iaea.org/topics/nuclear-safety-conventions/convention-nuclear-safety.

including technical cooperation related to safety (Article I, paragraph 1).

- Convention on the Safety of Spent Fuel and Radioactive Waste[1]; this agreement establishes fundamental safety requirements for the entire life cycle of spent nuclear fuel and nuclear waste up to their final disposal[2].

As their names suggest, these agreements are not aimed at preventing the proliferation of nuclear weapons and responding to international threats, but rather at preventing nuclear accidents. However, they remain important from a security policy perspective for two reasons: first, they establish technical and operational measures to prevent accidents and also limit the possibility of terrorist misuse of nuclear and radioactive materials. For example, restricting access to temporary storage facilities designated for radiation protection makes it more difficult for terrorist organisations to steal spent fuel elements. This is a desirable side effect of security policy. Second, although these agreements are not yet fully implemented, they have made a significant contribution to international standardisation of nuclear security. The Convention on the Physical Protection of Nuclear Material[3], mentioned above, goes even further in this regard. As the only such convention to date, it regulates the physical protection of nuclear material in accordance with international standards to prevent its misappropriation and misuse. However, the convention requires special protection only for the transboundary transport of nuclear material or temporary storage during transport, and does not require such protection for processing, storage, or transport within the territory of the contracting parties.

Furthermore, the required physical protection only concerns theft, and potential terrorist attacks and sabotage of nuclear facilities are not covered. Compared to the safeguards and monitoring of the Treaty on the Non-Proliferation of Nuclear Weapons[4], this agreement is very general in nature. It does not provide for any verification measures, does not establish a voluntary regulatory reporting system, and does not provide for international supervision of the regulation and technical control of nuclear weapons transfers by the contracting parties.

In view of the above, the IAEA has attempted to fill some of the gaps left by the Convention on the Physical Protection of Nuclear Material and Facilities[5] by publishing a comprehensive recommended catalogue entitled “Physical Protection of Nuclear Material and Facilities”. This catalogue covers technical and operational measures for the protection of nuclear facilities and nuclear material, reflects the state of the art and recommends standardised methods for the analysis of risks associated with threats to nuclear security.

These protective measures are designed to prevent theft of materials and damage to facilities. They are distributed according to the protection needs of the protected facilities, which are, in turn, classified by threat levels (concern). Large quantities of highly radioactive weapons-grade materials are at the highest threat level, while smaller quantities of materials, and fissile materials with lower radioactivity and purity (low enrichment, non-weapons-grade) are classified at lower protection levels. These measures also apply to the use, storage, and transport of materials within a country, but their main goal is to achieve international standardisation of national protective measures.

The UN Security Council Resolution[6] provided the legal basis for international efforts to combat nuclear proliferation and for physical protection. Among other things, the resolution established the mandatory rules set out in Chapter VII of the UN Charter[7], according to which all states must take physical security measures during the production, use, storage, and transport of nuclear, chemical, and biological weapons-grade materials. The resolution calls on states to adopt legislation prohibiting non-governmental organisations from producing, distributing or using weapons of mass destruction and their delivery systems, or to take measures to prevent such activities. It also provides for the appropriate control and accumulation of stockpiles of nuclear, chemical and biological weapons-grade materials.

[1] Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. (1997, September). Retrieved from https://www.iaea.org/topics/nuclear-safety-conventions/joint-convention-safety-spent-fuel-management-and-safety-radioactive-waste.

[2] Additional Protocol to the Agreement between Ukraine and the International Atomic Energy Agency on the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons. (2000, September). Retrieved from https://zakon.rada.gov.ua/laws/card/951_002.

[3] Convention on the Physical Protection of Nuclear Material. (1980, October). Retrieved from https://www-pub.iaea.org/MTCD/Publications/PDF/Pub615web.pdf.

[4] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.

[5] Convention on the Physical Protection of Nuclear Material. (1980, October). Retrieved from https://www-pub.iaea.org/MTCD/Publications/PDF/Pub615web.pdf.

[6] Resolution of Security Council of the UN No. 1540. (2004, April). Retrieved from https://digitallibrary.un.org/record/520326?v=pdf.

[7] United Nations Charter. (1945, October). Retrieved from https://www.un.org/en/about-us/un-charter.

Within six months of the adoption of the resolution, each UN Member State must submit a preliminary report to the Security Council Committee on the implementation of the resolution. This resolution[1] aimed to fill a gap in the international regulatory framework on the non-proliferation of weapons of mass destruction (nuclear weapons), since not all UN Member States are parties to the relevant non-proliferation treaties. However, this Security Council resolution indirectly brought them under the non-proliferation mechanism. Even if they are not regulated in themselves, they are at least linked to the objectives of its security policy. The intention of the Security Council on this issue is very clear, it repeatedly and explicitly referred to the non-proliferation treaties and emphasised that its resolution "affirms" the objectives of these treaties (Bibik *et al.*, 2025). However, the resolution did not address the regulation of radioactive materials and their civilian uses.

Article II, paragraph 2 of the Treaty on the Non-Proliferation of Nuclear Weapons[2] provides that States Parties shall transfer nuclear materials and equipment suitable for military use to non-nuclear-weapon states for peaceful purposes only, provided that such dual-use materials and technology are subject to safeguards and monitoring in accordance with Article III, paragraph 1, in the importing state. The States Parties have been aware from the outset that this provision provides for export controls and would therefore require them to be applied by states that sell nuclear technology internationally for civilian purposes.

Shortly after the Treaty on the Non-Proliferation of Nuclear Weapons[3] entered into force, two export control mechanisms emerged, and nuclear-weapon exporting states still use both mechanisms, partly in parallel. The first mechanism was developed in 1971 by the Zangger Commission, named after its long-time chairman, the Swiss professor Claude Zangger. The Zangger Committee defined nuclear exports using a "trigger" list, i.e., a list of critical materials and equipment that automatically activate the safeguards of the NPT Safeguards System in non-nuclear-weapon States (Herrera, 2025).

A second approach to control the export of nuclear products is based on the Guidelines of the so-called Nuclear Suppliers Group (NSG) (Lozova, 2020). The NSG Guidelines also include "trigger" lists and comprehensive safeguards, but their requirements are stricter. They require physical protection of nuclear facilities, written assurances from countries accepting special safeguards, special care in handling nuclear equipment and fissile materials, and special measures for technology transfer. However, the export control measures described are based solely on unilateral declarations of intent by supplier countries, which in some cases may be legally binding, agreed between supplier countries or unilaterally notified to the International Atomic Energy Agency, but no country is contractually obligated to comply with these declarations.

In the broadest sense, the control of nuclear materials and technology, which includes not only proliferation prevention but also the physical protection and control of non-fissile but radioactive materials, is supported by several international security policy initiatives, some of which have proven quite effective in their respective limited areas of activity.

Two of the most important initiatives are the G8-backed Global Partnership and the US-led Proliferation Security Initiative (PSI) (Ivanytskyi, 2023). The PSI aims to stop the international trade in weapons of mass destruction by extending existing border and export controls to international shipments (e.g., searching aircraft and ships carrying suspicious cargo, seizing illicit weapons or delivery systems). The PSI focuses on securing and disposing of weapons of mass destruction, including nuclear materials and their radioactive waste, which are still in the possession of some countries.

Since 2002, the IAEA has been implementing an action plan to prevent nuclear terrorism. In addition to strengthening the physical protection of nuclear materials, radioactive sources and nuclear facilities by IAEA Member States, the plan's activities include combating the international black market trade in radioactive materials and providing IAEA experts with advice on security and nuclear law to relevant organisations and facility operators. The plan costs approximately EUR 12 million per year, shared between several Member States and private organisations such as the Nuclear Threat Initiative (Newell, 2022). These activities essentially complement some of the IAEA's previous security assurance programmes, expanding their scope to include the prevention of terrorism. The Global Threat Reduction Initiative (GTRI), launched by the U.S. Department of Energy (DOE) in May 2004 and supported by the IAEA, is of a similarly complementary and complementary nature. Its main objectives include the identification of nuclear and radiological materials and related equipment not yet covered by existing threat reduction measures. In particular, GTRI aims to organise the return of spent

[1] Resolution of Security Council of the UN No. 1540. (2004, April). Retrieved from https://digitallibrary.un.org/record/520326?v=pdf.
[2] Treaty on the Non-Proliferation of Nuclear Weapons. (1968, July). Retrieved from https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons.
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highly enriched uranium from third countries to the supplying countries – the Russian Federation and the United States (International Partners' Conference, 2004). A further long-term goal is to convert all research reactors in the world to operate with low-enriched uranium, provided that they currently operate with highly enriched uranium.

■ Discussion

The issue of the effectiveness of international legal mechanisms for controlling nuclear and radiological materials is actively studied in contemporary scientific literature, which allows for a comparative analysis of the results obtained with the conclusions of other researchers. In particular, a significant contribution to the study of the nuclear non-proliferation system was made by Mohamed ElBaradei, Pierre Goldschmidt, Matthew Bunn, and Graham Allison.

Thus, the researcher of M. ElBaradei (2021) emphasises the effectiveness of the International Atomic Energy Agency safeguards system and considers it one of the main instruments of international security. However, the above analysis shows a slightly different picture, since modern threats associated with the activities of terrorist organisations and the illegal circulation of radioactive materials largely go beyond the conventional control mechanisms. In this aspect, the results of this study partially complement the researcher's position, indicating the need to expand international control instruments.

A similar opinion was expressed by P. Goldschmidt (2021), who in his research emphasised the need to strengthen international monitoring and introduce more stringent procedures for verifying the implementation of nuclear security obligations by states. The conclusions drawn by the researcher are quite relevant, since the results of the analysis also confirmed the existence of significant gaps in the international control system, in particular, regarding the physical protection of nuclear materials and their transportation.

Furthermore, G. Allison (2009) and M. Bunn *et al.* (2021) focused primarily on the threat of nuclear terrorism and the risks of illicit trafficking of nuclear materials. Their research proved that the most vulnerable link in the global security system is the insufficient level of physical protection of nuclear facilities in some states. These conclusions are largely consistent with the results of the study (Allison, 2009). However, the researchers' assertions that the main problem lies exclusively in national security systems seem debatable, since the above analysis also indicates the presence of institutional shortcomings at the international level (Bunn *et al.*, 2021).

The reason for the different interpretations may lie in different methodological approaches to analysing the problem: while the aforementioned researchers mainly focused on security and political aspects, this study paid more attention to international legal regulatory mechanisms. In this regard, the conclusions of these researchers, considering the results of this study, can be considered in a broader context that combines legal, institutional, and security aspects of control over nuclear and radiological materials.

Despite the valuable scientific achievements of the aforementioned researchers, the current study focused on the problems of international legal mechanisms for controlling nuclear and radiological materials precisely in conditions of unforeseen dangers, such as theft, terrorism, etc. Radioactive materials are not suitable for the production of weapons of mass destruction, but if they are crushed or dispersed in liquid form in the open environment, or if they enter the soil, air or water, or if they are inhaled or swallowed, they can cause radiation damage to the population and the environment. Since radioactive materials have a wide range of civilian applications and are widely distributed, the rules for their protection and control vary greatly from country to country, and these rules are often poorly implemented. It is therefore foreseeable that terrorist organisations will seek to obtain radioactive materials through theft and illicit trade to use them as radioactive weapons, thereby achieving the greatest terrorist impact with relatively little technological and organisational investment.

In an international agreement on the physical protection of nuclear materials and facilities, the degree of cooperation between individual states is always a decisive factor in effectiveness, along with technical and organisational criteria. This is especially true of the expanded CPPMN. In this light, this project is by no means less effective than its alternatives. It represents a relative optimum, combining technical and regulatory efficiency with the widest possible international acceptance of the expanded CPPMN, while avoiding a compromise between the two.

The contracting parties may violate the agreement through negligence, lack of technical expertise or insufficient resources, but they have no strategic interest in violating the convention, since violating the treaty does not improve their chances of success in a military conflict. Rather, it can always be assumed, to a good approximation, that the treaty objective of the expanded CPPMN corresponds to the common interests of all member states. In this respect, the problem of (lack of) CIMO monitoring and verification is of a completely different nature than the problem of arms control verification. If a state fails to fulfil its CIMO obligations or is unable to do so under the circumstances, it is primarily putting its own security at risk. Accordingly, in such a case, the appropriate response should not be through

treaty verification, but in accordance with the IAEA's concept of providing advice and support to that state on technical, organisational, and nuclear law issues. Experience has shown that technical advice and assistance from the IAEA and expert groups from high-tech countries is usually met with a high degree of cooperation from the recipient states.

The effectiveness of the Code of Conduct on the Safety and Protection of Radioactive Sources should also be assessed based on the extent to which non-binding guidelines and recommendations can contribute to addressing international security policy issues through the control of civil materials and the management of operational safety. The European regulatory framework is still largely dependent on radiation protection and accident prevention requirements (Hans, 2025). Measures specifically aimed at combating the systematic, organised misuse of radiological sources for criminal and terrorist purposes should be considered more frequently from a security policy perspective. The security policy challenges and solutions outlined demonstrate that international control of nuclear and radiological materials requires new rules compared to the control of conventional nuclear weapons. New approaches in this respect do not have the strict requirements of the NPT regime.

Conclusions

The subject of the research was the investigation of the problems of international legal mechanisms for controlling nuclear and radiological materials in conditions of unforeseen risks, such as official negligence, theft, terrorism, etc. The current study has allowed reaching these conclusions, given the circumstances the world is currently in. Given the threat of terrorism, the current rules on nuclear non-proliferation are insufficient. The Non-Proliferation Treaty on the Non-Proliferation of Nuclear Weapons does not oblige the contracting parties to protect nuclear materials and facilities from theft or terrorist sabotage. Therefore, the level of physical protection provided by the contracting parties to the NPT to nuclear weapons materials and civilian nuclear facilities (reactors, temporary storage facilities, plants for the production and reprocessing of nuclear fuel rods) varies significantly. There are also significant differences between developed and developing countries in the technological and financial resources available to implement effective protection measures. For example, the Russian Federation still stores thousands of tonnes of plutonium, uranium, and high-level spent nuclear fuel intended for civilian and military use. These materials, a legacy of the Soviet Union, are so large that their quantitative inventory, monitoring, and physical protection against misuse are extremely complex. In many other countries, security issues regarding civilian use (research, energy production), transportation, reprocessing, interim storage, and disposal of usable and spent nuclear fuel remain unresolved. In these circumstances, even within the constraints of the Nuclear Non-Proliferation Treaty, these materials are highly vulnerable to theft, smuggling, and entry into international illicit trade.

Although the International Atomic Energy Agency and other international organisations have worked for decades to promote the monitoring, protection and export control of nuclear technology and materials through subsequent treaty arrangements (such as the 1980 Convention on the Physical Protection of Nuclear Material), technical assistance programmes, international cooperation and other large-scale activities, these activities, together with the support of organisations such as the Committee on the Prevention and Prohibition of Nuclear Medicine, still need to be based on internationally standardised procedures. However, the international nuclear medicine system remains fragmented in key areas. In recent years, its shortcomings have become truly apparent with the escalation of security threats from terrorism. Another new challenge facing security policy is the protection and control of radioactive sources used in civilian sectors such as industry, research, and medicine. These sources consist of non-fissile, non-concentrated materials, but without the necessary radiation protection measures they can still be highly radioactive, causing serious harm to people and the environment.

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Проблеми міжнародно-правових механізмів контролю за ядерними та радіологічними матеріалами

Ірина Лесь
Кандидат юридичних наук, доцент
Національна академія внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ, Україна
https://orcid.org//0000-0003-0596-3749

■ **Анотація.** Це дослідження мало на меті вивчення проблем міжнародно-правових механізмів контролю за ядерними та радіоактивними матеріалами. У статті як основний використано формально-правовий метод, оскільки він дає змогу аналізувати правові норми, структури та концепції. Дослідження засвідчило, що нерозповсюдження ядерної зброї та збройових ядерних матеріалів ґрунтується переважно на Договорі про нерозповсюдження ядерної зброї 1968 року, який встановлює суворі правила використання цивільних ядерних матеріалів і технологій у всьому світі та контролюється Міжнародним агентством з атомної енергії у Відні. Однак унаслідок підвищення активності міжнародних терористичних організацій останніми роками чинні положення щодо ядерного нерозповсюдження виявилися недосконалими й неадекватними. У дослідженні зазначено, що політика безпеки та цивільної оборони повинна ґрунтуватися на тому факті, що терористичні організації прагнуть отримати ядерні матеріали для нападів. Ядерний тероризм є поширеним, оскільки Договір про нерозповсюдження ядерної зброї не вимагає від держав-членів захищати ядерні матеріали й об'єкти від крадіжки або терористичного саботажу. Фактично на міжнародному рівні фізичний захист матеріалів ядерної зброї та цивільних ядерних установок (реакторів, сховищ для тимчасового зберігання та заводів з виготовлення та переробки паливних стрижнів) істотно різниться. Чимало країн не мають належного захисту для транспортування, переробки, тимчасового зберігання та захоронення придатного для використання та відпрацьованого ядерного палива, що призводить до втрат, крадіжок, контрабанди й незаконної міжнародної торгівлі цими матеріалами. Практичне значення цього дослідження полягає в тому, що аналіз проблем міжнародно-правових механізмів контролю за ядерними та радіоактивними матеріалами дає змогу оцінити недоліки наявних механізмів й усунути їх, тим самим забезпечуючи найвищий рівень безпеки та контролю за ядерними і радіоактивними матеріалами

■ **Ключові слова:** Договір про нерозповсюдження ядерної зброї; ядерна зброя; політика безпеки; терористичні загрози; радіоактивні матеріали

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Reforming the UN Security Council: Legal and political challenges

Rilinda Maqellara Mehmeti*
Professor
Ministry of Justice of the North Macedonia
1000, 9 Dimitrie Chupovski Str., Skopje, North Macedonia
https://orcid.org/0000-0002-9581-4140

■ **Abstract.** This study examined the legal and political-institutional conditions for reforming the United Nations Security Council and assesses the significance of such reform for international law and global governance. The research was based on formal-legal, historical-legal, comparative, and problem-oriented legal methods. The study argue that Security Council reform has a distinctly political and legal character, since any modification of the Council's composition, the status of its members, or its decision-making procedures must be consistent with the Charter of the United Nations. The veto power remains one of the main constraints on the Council's effectiveness, as it enables a permanent member to prevent the adoption of a decision even when that decision is supported by a majority. The Charter amendment procedure also creates a high legal threshold for reform because it requires ratification by all permanent members of the Security Council. The 1963 enlargement of the Council demonstrated that institutional reform is legally possible, but it also illustrates the limits of reform that does not address the status of permanent members or the veto mechanism. The study showed that the positions of the Group of Four, comprising Brazil, Germany, India, and Japan, the African Union, United for Consensus, the United Kingdom, France, and China reflect different approaches to representation, regional balance, and the distribution of institutional privileges. The legal implications of reform depended not only on enlarging the Security Council, but also on reducing the blocking effect of the veto, strengthening transparency, and increasing the accountability of permanent members. For small states, particularly North Macedonia, reform was important as a means of enhancing the predictability of the international legal order and promoting a more equal application of international legal norms. The study concluded that Security Council reform should be approached as a gradual process aimed at broader representation, constraints on the use of the veto, greater accountability, and stronger global governance. Its practical significance lies in the possibility of using the findings to develop expert assessments and recommendations on Security Council reform, the reduction of the negative effects of the veto, and the improvement of the Council's effectiveness

■ **Keywords:** veto power; voting procedure; procedural accountability; global governance; regional representation

■ Introduction

Reform of the United Nations (UN) Security Council remains a central issue in contemporary international law and global governance, since the Council's institutional design continues to reflect the distribution of power established after the Second World War. The substantial increase in UN membership, the growing political importance of the Global South, Africa's claims to permanent representation, criticism of the veto mechanism, and the Council's limited ability to respond effectively to certain international crises all demonstrate the need to reconsider its legal and political framework. This debate includes several reform options currently discussed within the UN intergovernmental negotiations on Security

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■ *Corresponding author (*rilindamaqellaramemwti@outlook.com*)

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Council reform: enlarging the Council through additional permanent and non-permanent seats, improving the representation of underrepresented regions, especially Africa, reconsidering the procedure for the use of the veto, and improving the Council's working methods (United Nations General Assembly, 2025). At the same time, reform is constrained by a fundamental legal contradiction. Amendments to the UN Charter require the consent of the permanent members of the Security Council, although these are precisely the states whose institutional privileges, veto power, permanent status, and special political and legal position could be affected by such reform. As a result, legally possible changes remain difficult to implement, because they depend on the approval of actors that have a direct interest in maintaining the existing system of institutional privileges.

In the academic literature, reform of the Security Council is examined from several analytical perspectives. S. Amevor *et al.* (2025) associate the reform agenda with the need to enhance both fairness and institutional effectiveness by involving additional influential states in the Council's decision-making process. From this perspective, enlargement is not merely a political aspiration of particular states, but a broader attempt to bring the institutional structure of the United Nations closer to the actual distribution of power in the contemporary international system. B.Z. Winther (2022), however, offers a more critical assessment of the reform agenda advanced by the Group of Four (G4) – Brazil, Germany, India, and Japan. In his view, the G4 approach does not sufficiently reflect the concerns and priorities of the Global South, because it is primarily centred on the pursuit of new permanent seats. Consequently, the expansion of permanent membership may fail to resolve the problem of institutional inequality within the Security Council and may instead reproduce it by creating an additional category of privileged states.

The African aspect of Security Council reform is addressed by A. Sellström (2023), who draws attention to the institutional asymmetry between permanent and elected members of the Council, particularly with regard to the participation of African states. From this perspective, broader African involvement is significant not only as a matter of regional representation, but also as a condition for strengthening the legitimacy, inclusiveness, and institutional balance of the Security Council. G. Mbara's (2021) analysis of the Ezulwini Consensus further shows that the African Union's position is not limited to a demand for representation. It also reflects a broader effort to remedy historical injustice within the system of global governance. Accordingly, Security Council reform should be understood not only as an institutional adjustment, but also as a process with a distinct legitimising function. M. Binder & M. Heupel (2021) emphasise the inherent complexity of the reform process. Their analysis suggests that the maximalist positions advanced by different groups of states tend to neutralise one another, making comprehensive reform difficult to achieve. For this reason, a viable reform model would need to balance representation, effectiveness, and political feasibility. Such an approach supports the view that Security Council reform is unlikely to occur as a single comprehensive transformation; rather, it should be seen as a gradual process shaped by the legal constraints of the UN Charter and by the political consent of the permanent members.

In relation to North Macedonia, G. Leka *et al.* (2025) demonstrate that limited territorial size and material capacity do not necessarily prevent a state from pursuing an active foreign policy. Their study shows that small states may increase their international agency through participation in multilateral institutions, diplomatic flexibility, and reliance on normative instruments. G. Leka (2025) further examines North Macedonia's foreign policy between 2006 and 2017, interpreting it as part of the state's broader effort to enhance its international status. From this perspective, the foreign policy of small states serves not only to protect national interests, but also to strengthen external recognition and political visibility. T. Risteski (2026) adds another dimension by emphasising the influence of the European political and security architecture on North Macedonia's development during the first three decades of its statehood. This suggests that engagement with European and multilateral security frameworks is an important condition for stability, international integration, and the consolidation of small states' positions within the broader international order.

Although the reform of the UN Security Council has been widely discussed in the existing literature, most studies tend to focus on separate dimensions of the issue, such as representation, the positions of regional groups, Africa's role, the G4 proposal, the veto power, or the relevance of reform for small states. Less attention has been paid to the interaction between the legal limitations established by the UN Charter, the political interests of states, and the practical difficulty of reaching a commonly accepted reform model. Accordingly, this study aimed to examine the legal and political factors shaping the reform of the UN Security Council and to assess their implications for international law and global governance. To achieve this aim, the study pursues the following objectives:

1. to determine the legal basis for reforming the UN Security Council, in particular the provisions of the UN Charter, the procedure for amending it and the role of the veto right;

2. to analyse the political approaches of states and groups of states to reforming the UN Security Council – the G4, the African Union, Uniting for Consensus, the United Kingdom, France, China;

3. to clarify the legal consequences and prospects of reforming the UN Security Council for international law, global governance and small states, in particular using the example of North Macedonia.

Materials and Methods

The study was based on a qualitative theoretical and legal research design aimed at examining the legal, institutional, and political-procedural dimensions of UN Security Council reform. The chronological scope of the analysis covered the period from the 1963-1965 reform, when the Council's membership was formally enlarged, to the intergovernmental negotiations conducted in 2024-2025. This timeframe was selected because the 1963-1965 reform remains the only completed formal amendment to the Council's composition, while the 2024-2025 stage reflects the current debate on categories of membership, regional representation, the veto power, and the Council's working methods. The historical-legal method was used to reconstruct the main stages in the institutionalisation of the reform process. These stages included the enlargement of the Council in 1963-1965, the inclusion of equitable representation and an increase in Security Council membership as a separate item of negotiation in 1993, the establishment of a requirement for broad support among Member States in 1998, the launch of intergovernmental negotiations in 2008, and the continuation of discussions during the 79th session of the United Nations General Assembly (1963; 1993; 1998; 2008; 2025; 2026). Particular attention was also paid to the 2025 generalisation of state positions on membership categories, regional representation, the veto power, the Council's working methods, and possible reform models. The collected materials were systematised according to several criteria: the year or stage of the reform process, the relevant document, the substantive characteristics of each stage, and its analytical significance for the development of Security Council reform. This approach made it possible to trace the evolution of the reform agenda from the first formal change in the Council's composition to the intergovernmental negotiation process of the twenty-first century.

The formal-legal method was applied to examine Articles 23, 24, 27, 108 and 109 of the United Nations Charter[1], which define the Security Council's position within the UN system, its composition, mandate, voting procedure, the special voting role of permanent members, and the legal requirements for amending the Charter. This analysis made it possible to determine the legal limits of Security Council reform, particularly with regard to changes in the Council's composition, the voting procedure, and the potential revision of the powers of permanent members. The comparative legal method was used to analyse the positions of the principal actors involved in the reform debate. The comparison covered Permanent Mission of Japan to the United Nations (2026), African Union Executive Council (2005), Government of Canada (2024), the United Kingdom (Young, 2024), France (Dharmadhikari, 2025), and China (Ministry of Foreign Affairs of the People's Republic of China, 2025). These actors were selected because their positions reflect the main approaches to Security Council reform and illustrate the political contradictions that hinder the formation of a commonly accepted reform model. The comparison was conducted according to four criteria: the actor or group of states, its main position on reform, the justification of that position, and its analytical significance for the broader reform process.

The problem-legal method was applied to examine the veto power as a distinct legal and political-procedural issue within the broader context of UN Security Council reform. The analysis relied on materials from the United Nations Security Council (n.d.a), the United Nations General Assembly (2022), and Security Council Report (2026). These sources were selected because they provide a basis for assessing the practice of veto use, mechanisms of political accountability, voluntary restraints on the veto, and possible approaches to reducing its negative effects. Generalisation and systematisation were used to identify the legal implications of Security Council reform for international law and global governance, as well as the conditions under which such reform could have practical significance. The analysis was based on the works of M. Khalil & F. Lavaud (2024), C. Tomuschat (2008), Resolution of the United Nations General Assembly No. 377 A(V) "Uniting for Peace"[2], and documents of the United Nations Security Council (n.d.b). The legal consequences were classified according to four criteria: the direction of influence, the nature of the consequence, the conditions for implementation, and the risks associated with implementation.

The position of North Macedonia was examined as an illustrative case of a small state that does not seek permanent membership in the Security Council but has a clear interest in a predictable international legal order, greater accountability of the Council, and

[1] United Nations Charter. (1945, June). Retrieved from https://www.un.org/en/about-us/un-charter/full-text.
[2] Resolution of the United Nations General Assembly No. 377 A(V) "Uniting for Peace". (1950, November). Retrieved from https://digitallibrary.un.org/record/666446?v=pdf.

a more equal application of international law. The analysis focused on the statement delivered by the President of North Macedonia (Siljanovska-Davkova, 2025) and the EU statement joined by North Macedonia (Delegation of the European Union…, 2025). These materials were used to support practical recommendations concerning a phased approach to UN Security Council reform. The study is limited by its theoretical and analytical character. It relies on legal norms, official documents, and publicly available positions of states, while informal diplomatic negotiations and closed processes through which states formulate their positions on Security Council reform remain outside the scope of the analysis.

Results and Discussion

Legal and political foundations of the reform of the UN Security Council

The legal basis for reforming the UN Security Council is laid down in the UN Charter. The UN Charter defines the place of the Security Council within the UN system, including its composition, powers, voting procedure and the procedure for amending the UN Charter itself. In particular, Article 24(1) of the United Nations Charter[1] states that the Member States of the UN "entrust the Security Council with the primary responsibility for the maintenance of international peace and security". Thus, the reform of the Security Council cannot be a political issue alone. The issue of reform of the Security Council also has legal aspects to it. The decisions of the Security Council have a significant impact upon international law, including in determining whether there is a threat to peace, a breach of the peace or an act of aggression against another State, and in determining the need for the application of sanctions to those states that are initiating such threats, breaches or acts. Thus, reforming the Security Council has an impact upon international law.

The current model of the United Nations Security Council is based on the special position of the five permanent members of the Council, as defined in Article 23 of the UN Charter. While there is no explicit mention of the veto power of the permanent members in the Charter as such, the voting rules laid out in Article 27(3) state that the decisions of the Security Council on matters that are not procedural in nature are to be adopted with the concurring votes of the permanent members of the Council. Thus, any one of the permanent members has the power to reject any proposals that are put forward by the other members of the Council, regardless of the voting outcome of the other members of the Security Council. The main legal obstacle to reforming the United Nations Security Council is the procedure for amending the United Nations Charter. According to Articles 108 and 109 of the UN Charter, the proposed amendments to the charter must first gain the approval of a majority of all Member States of the United Nations, as well as be ratified by each of the permanent members of the Security Council itself. Thus, any country whose privileges may be amended by a reform to the Security Council still holds the power to reject that proposed reform. Consequently, while it is legally possible to reform the United Nations Security Council, the procedural difficulties of such a reform indicate that it would be necessary not just to gain the support of a majority of the United Nations' Member States, but also the support of each of the permanent members of the Security Council.

Historical practice demonstrates that reform of the Security Council is possible within the existing international legal framework. In 1963, the General Assembly adopted a resolution providing for an increase in the number of Security Council members. After the relevant amendments entered into force in 1965, the Council's membership was enlarged from 11 to 15 members. This precedent confirms that the institutional structure of the Security Council may be modified through the formal amendment procedure. At the same time, the 1963-1965 reform had a limited scope, since it did not alter the status of permanent members or affect the veto power. The current reform agenda is broader and more complex. It concerns not only the size of an enlarged Council, but also categories of membership, regional representation, possible restrictions or revisions concerning the use of the veto, and the Council's working methods. These issues are reflected in the Co-Chairs' document on convergences and divergences in the positions of states on Security Council reform (United Nations General Assembly, 1963). The principal legal difficulty is therefore not the absence of a reform mechanism, but the fact that the use of this mechanism depends on the consent of the permanent members. This creates a structural contradiction within the current model: reform seeks to reduce the imbalance between permanent members, which possess veto power, and non-permanent members, which do not have comparable blocking authority. For this reason, a gradual reform strategy appears more realistic. Such a strategy would combine improvements in the Council's working methods, greater transparency, broader representation, mechanisms of political accountability for the use of the veto, and a stronger role for the General Assembly in situations where the Security Council is blocked. The main stages in the institutionalisation of this reform process are summarised in Table 1.

[1] United Nations Charter. (1945, June). Retrieved from https://www.un.org/en/about-us/un-charter/full-text.

Table 1. Stages of institutionalisation of the UN Security Council reform process

Year/stage	Document	Stage characteristics	Analytical importance for reform
1963	United Nations General Assembly	In 1963, a resolution on expansion was adopted, and the changes entered into force after ratification in 1965	The only example of a successful formal change in the composition of the Security Council. At the same time, the reform did not change the status of the permanent members and the right of veto
1993	United Nations General Assembly	The issue of equitable representation and an increase in membership in the Security Council was submitted to a separate negotiation process	The reform became a systemic issue on the UN agenda after the end of the Cold War
1998	United Nations General Assembly	The requirement for broad support of member states for decisions on Security Council reform was established	Raising the political threshold for reform and complicating the promotion of models that do not have a broad consensus
2008	United Nations General Assembly	Intergovernmental negotiations on Security Council reform were initiated	Intergovernmental negotiations on the reform of the UN Security Council became the main platform for the negotiation process
2024-2025	United Nations General Assembly	Discussions on reform continued within the 79th session of the General Assembly	This is confirmed that the reform remains a relevant item on the UN agenda
2025	United Nations General Assembly	The positions of states on the composition of the Council, categories of membership, regional representation, veto power and working methods were summarised	There are both points of convergence and differences between states, due to which the reform remains incomplete

Source: compiled by the author based on United Nations General Assembly (1963; 1993; 1998; 2008; 2025; 2026)

The reform of the UN Security Council has developed much more slowly than the international system itself. Since 1945, UN membership has expanded substantially, while the political weight of Asia, Africa, Latin America, and the Global South has also increased. However, the institutional structure of the Security Council has only partially reflected these transformations. The documents adopted or discussed in 1993, 1998, and 2008 show that the reform process gradually became institutionalised within the UN framework. At the same time, the length of this process indicates persistent disagreements among states regarding the future structure of the Council. The 2024-2025 stage demonstrates that states generally accept the need to make the Security Council more representative, transparent, and accountable. Nevertheless, there is still no common position on the creation of new permanent seats, the possible expansion of non-permanent membership, the future of the veto power, or the model of regional representation.

A similar logic of overcoming procedural deadlock can be found in earlier UN practice. One example is the "Uniting for Peace" mechanism, discussed by C. Tomuschat (2008) and embodied in Resolution of the United Nations General Assembly No. 377 A(V) "Uniting for Peace"[1]. This mechanism was designed for situations in which the Security Council is unable to act effectively because of the absence of unanimity among its permanent members. In such circumstances, the General Assembly may consider the matter and recommend collective measures to Member States. Although this mechanism did not abolish the veto or alter the institutional structure of the Security Council, it created a procedural alternative for addressing situations in which the Council is blocked. A comparable function is performed by United Nations General Assembly (2022) Resolution 76/262, which provides for the automatic convening of a General Assembly debate when a veto is cast in the Security Council. This resolution also leaves the UN Charter unchanged and does not restrict the formal veto power of permanent members, but it increases the political accountability of the state that uses the veto. Previous UN practice therefore demonstrates that, where agreement on deep institutional reform is absent, procedural adjustments may still be possible. These include strengthening the role of the General Assembly, improving transparency, requiring public explanation of positions, and developing mechanisms of political accountability. The central obstacle is therefore not the absence of procedural instruments, but the lack of political consensus on the substance of Security Council reform. These disagreements are reflected in the positions of key states and groups of states concerning the future model of the Council, as shown in Table 2.

[1] Resolution of the United Nations General Assembly No. 377 A(V) "Uniting for Peace". (1950, November). Retrieved from https://digitallibrary.un.org/record/666446?v=pdf.

Table 2. Comparative characteristics of approaches of key actors to reform the UN Security Council

Entity/group of states	Main position regarding reform	Justification of approach to reform	Analytical value
G4: Brazil, Germany, India, Japan	Support the expansion of the Security Council in both permanent and non-permanent categories	The discrepancy between the influence of the G4 states in the international system of the twenty-first century and the absence among the permanent members of the Security Council	The G4 model enhances the representativeness of the Council, but at the same time raises the issue of new permanent privileges
African Union	Calls for the redress of historical injustices against Africa and for permanent African representation on the Security Council	The need to address the imbalance between the role of Africa in the UN system and its lack of permanent representation in the Security Council	Strengthens the legitimisation dimension of reform, since without proper representation of Africa, the Security Council cannot fully reflect the universal nature of the UN
Uniting for Consensus	Opposes the creation of new permanent seats and supports the expansion of mainly non-permanent or long-term elected members	The creation of new permanent seats may reproduce existing inequalities and consolidate new forms of privileged status	Proposes a more flexible approach, but does not satisfy the demands of states that aspire to permanent membership, in particular the G4 and the African Union
the United Kingdom	Supports the expansion of the Security Council, including permanent seats for Africa, Brazil, Germany, India, and Japan	The position is based on the need to make the Security Council more representative, taking into account the modern political realities of the twenty-first century	Demonstrates support for expansion from part of the P5, but without a radical revision of the veto
France	Supports the expansion of the Security Council, including permanent representation for the G4 and greater representation of Africa	Combines the argument for the need for broader representativeness with the need to preserve the Security Council's ability to act effectively	Is open to expansion, but does not address the issue of the powers of new permanent members
China	Supports "necessary and sensible" reform, emphasising the priority of developing countries, particularly Africa	Prioritising the interests of developing countries and strengthening the representation of the Global South	Demonstrates one of the key political barriers: the P5 may support reform in general, but restrain specific models that change the balance of power

Source: compiled by the author based on African Union Executive Council (2005), Government of Canada (2024), A. Young (2024), J. Dharmadhikari (2025), Ministry of Foreign Affairs of the People's Republic of China (2025), Permanent Mission of Japan to the United Nations (2026)

A comparison of the positions of the key actors demonstrates that the political difficulty of Security Council reform does not result from a general rejection of reform itself. Rather, it stems from the absence of a shared model for implementing institutional change. The central disagreement concerns the future status of membership. The G4 and the African Union support the expansion of permanent representation, whereas United for Consensus opposes the creation of new permanent seats, arguing that such a model could reproduce existing institutional inequalities in another form (African Union Executive Council, 2005; Government of Canada, 2024). These divergent positions show that the debate is not limited to the question of representation. It also concerns the preservation or redistribution of permanent privileges within the Security Council. The positions of the current permanent members further illustrate the limited and selective nature of support for reform. The United Kingdom and France favour an expansion of the Council, while China links reform primarily to stronger representation of the Global South and underrepresented regions (Young, 2024; Dharmadhikari, 2025; Ministry of Foreign Affairs of the People's Republic of China, 2025). In particular, China's representative to the United Nations, Fu Cong, emphasised during the 80th session of the UN General Assembly that Africa and other underrepresented regions should receive greater representation in the Security Council. However, none of these positions implies a fundamental revision of the veto mechanism. Therefore, although there is formal recognition of the need to update the Security Council, this does not amount to consensus on its future composition, categories of membership, regional distribution, or the status of potential new members.

Reform of the UN Security Council should therefore not be treated merely as a question of political expediency. It is directly connected with the UN Charter, which regulates the Council's composition, voting procedure, the status of permanent members, and the procedure for adopting amendments. Any redistribution of authority within the Council must therefore satisfy two conditions: it must comply with the formal requirements of the Charter and, at the same time, obtain political support from states, especially from the permanent members of the Security Council. This conclusion corresponds to T. Rensmann's (2024) approach, which examines institutional change within the UN system through the legal provisions and procedures of the Charter. However, the present study applies this perspective

specifically to the Security Council and shows that the legal framework of reform has not only procedural but also political significance. The findings also correspond to O.A. Hathaway *et al.* (2025), who emphasise the difficulty of formal UN reform due to the high procedural threshold and the role of permanent members. At the same time, this study develops the argument further by focusing on the structural contradiction of the Security Council model. The UN Charter allows institutional amendments, but their implementation depends on the consent of the very states whose privileges may be affected by reform. For this reason, the legal possibility of Security Council reform does not automatically ensure its practical feasibility. The main limitation lies not in the absence of a legal mechanism, but in the dependence of that mechanism on the political will of the permanent members.

The political dimension of the reform shows that the main difficulty is not the absence of broad recognition that the UN Security Council requires renewal. Rather, the problem lies in the lack of agreement on what such renewal should involve. This view is consistent with D. Archibugi *et al.* (2025), who connect Security Council reform with questions of representation, the veto power, and the effectiveness of decision-making. For the G4, representation is primarily understood through the expansion of permanent membership to include Brazil, Germany, India, and Japan (Permanent Mission of Japan to the United Nations, 2026). Such a model could make the Council more consistent with the contemporary distribution of political and economic influence. At the same time, it may also create an additional layer of permanent privileges rather than overcoming the existing hierarchy. The African Union approaches reform from a different perspective. Its position is linked to the need to address Africa's historical underrepresentation in the Security Council and therefore gives the reform a legitimising dimension (African Union Executive Council, 2005). By contrast, United for Consensus adopts a more cautious position. It opposes the creation of new permanent seats and instead favours the expansion of elected or longer-term elected membership. This approach may reduce the risk of entrenching new permanent privileges, but it does not meet the expectations of states seeking permanent membership.

The positions of the United Kingdom and France indicate that some permanent members are prepared to support the enlargement of the Security Council, including through the addition of the G4 states and stronger African representation, but without a fundamental revision of the veto power (Young, 2024; Dharmadhikari, 2025). China also supports broader representation for countries of the Global South, although its approach remains cautious toward reform models that could alter the balance of power among the permanent members. For this reason, a phased and combined model of reform appears to be the most realistic option. Such a model would bring together broader regional representation, a stronger role for non-permanent or longer-term elected members, improvements in the Council's working methods, and greater political accountability for the use of the veto. This approach is more feasible because it takes into account the representational demands of the G4 and the African Union, the concerns of United for Consensus regarding new permanent privileges, and the dependence of reform on the positions of the P5. The negotiation process therefore remains incomplete not because of the absence of procedural platforms, but because of the incompatibility of political interests and competing reform models. The 1963 reform confirms that changes to the structure of the Security Council are legally possible within the existing international legal order. However, this precedent also has clear limits, since the 1963 enlargement concerned only the number of Council members and did not affect the status of permanent members or the veto power. This finding corresponds to the approaches of C. Cai *et al.* (2024) and S. Chesterman (2025), who examine the contemporary Security Council in the context of global polarisation, declining effectiveness, and criticism of its representativeness. In contrast to the 1,963 reform, the current reform agenda is broader and more complex. It concerns not only enlargement of membership, but also questions of legitimacy, institutional efficiency, and the distribution of privileged authority within the Council.

E. Parvanova (2023) examines the G4 position as an attempt by Brazil, Germany, India, and Japan to align their international status with their political and economic influence in the contemporary international system. N.M. Alene *et al.* (2023) connect the African Union's demands with the need to ensure fair African representation and to address historically rooted inequalities in global governance. N. Pirozzi (2023), in turn, analyses the position of Uniting for Consensus as an alternative reform logic. This approach rejects the creation of new permanent seats and instead favours a more flexible model of participation based on non-permanent or longer-term elected membership. Taken together, these positions demonstrate the absence of a shared understanding of what Security Council reform should ultimately entail. The G4, the African Union, and Uniting for Consensus all recognise the need for change, but they advance different visions of the Council's future structure. This explains the political complexity of the reform process not simply as a conflict between supporters and opponents of change, but as a competition between different concepts of representation,

status, and the distribution of influence within the Security Council.

The reform of the UN Security Council should not be reduced to the creation of additional permanent seats. A more practical direction may involve strengthening the role of non-permanent members, especially when this is combined with broader representation, greater transparency, and stronger accountability within the Council. This conclusion is consistent with V.N. Pay & P. Postolski (2022), who show that elected members of the Security Council can influence its work through diplomatic engagement, agenda-setting, and the promotion of specific norms. At the same time, a purely numerical enlargement of the Council would not, by itself, resolve the problems of effectiveness and legitimacy. Such enlargement would need to be accompanied by procedural mechanisms that improve transparency, accountability, and the Council's capacity to act. A useful analogy may be drawn from the practice of the European Union. Qualified majority voting in the Council of the EU reduces the dependence of decision-making on the unanimous consent of all member states (Council of the European Union, 2026). In addition, Article 16 of the Consolidated Version of the Treaty on European Union[1] provides for the public nature of Council meetings when draft legislative acts are discussed and voted upon. For the UN Security Council, this comparison should not be understood as a proposal to directly transfer the EU model. Rather, it shows that the effectiveness of a collegial institution may be improved through procedural openness, clearer decision-making rules, public explanation of positions, and a reduced capacity of individual actors to block collective action. This view corresponds to I. Johnstone's (2024) emphasis on the legitimacy of the Security Council and to R. Gowan's (2026) argument that pragmatic compromise remains possible within the Council's work. Accordingly, Security Council reform should be understood not only as a question of membership enlargement, but as a broader combination of representation, a stronger role for non-permanent members, transparency, accountability, institutional effectiveness, and political feasibility.

Thus, Security Council reform should be understood not merely as a question of membership enlargement, but as a broader political and legal problem connected with the UN Charter, the veto power, the status of permanent members, and the absence of an agreed reform model. The comparison with existing academic approaches confirms that the central difficulty lies in reconciling the legal possibility of reform with its political feasibility. For this reason, the most realistic direction is a gradual reform process that combines broader representation, a stronger role for non-permanent members, greater transparency and accountability, and the development of mechanisms of political responsibility for the use of institutional privileges.

Legal implications of UN Security Council reform for global governance

The veto power, which is legally grounded in Article 27(3) of the United Nations Charter[2], is of particular importance in the context of Security Council reform. It affects not only the Council's voting procedure, but also its practical capacity to carry out its mandate for the maintenance of international peace and security. In general, legal terms, the veto confirms the special status of the permanent members. However, when the legal consequences of reform are examined, it also appears as a mechanism that may directly limit the effectiveness of the international legal response to crises. The practice of veto use since 1946 shows that this mechanism has repeatedly been applied in matters concerning international conflicts, sanctions, peacekeeping operations, and humanitarian crises (United Nations Security Council, n.d.a). The legal difficulty becomes especially acute when a permanent member has a direct interest in preventing an international legal response to a particular conflict. In such situations, the veto is not merely a procedural instrument, but a systemic factor affecting the functioning of collective security. The complete abolition of the veto power in the near future appears unlikely. This is explained not only by the political unwillingness of permanent members to give up their privileged position, but also by the amendment procedure established by the UN Charter. Under Articles 108 and 109 of the Charter, far-reaching reform requires adoption and ratification in accordance with the prescribed procedure, including ratification by all permanent members of the Security Council. As a result, any revision of the veto power depends on the consent of the very states that currently possess and use this right.

A more practically attainable way to reduce the negative effects of the veto is to strengthen the political accountability of the permanent members of the Security Council. One relevant mechanism is United Nations General Assembly (2022) Resolution 76/262, which provides for the automatic convening of a General Assembly debate when a veto is cast in the Security Council. Although this resolution does not alter the formal powers of the Security Council, it creates an additional accountability mechanism by requiring

[1] Consolidated Version of the Treaty on European Union. (2016, June). Retrieved from https://eur-lex.europa.eu/eli/treaty/teu_2016/art_16/oj/eng.
[2] United Nations Charter. (1945, June). Retrieved from https://www.un.org/en/about-us/un-charter/full-text.

political scrutiny of the permanent member that has used the veto. V. Serdiuk (2024) also interprets Resolution 76/262 as a means of strengthening the collective response of the international community in cases where Security Council action is blocked by the veto. Another possible direction is the voluntary restraint of veto use in situations involving mass crimes. The Code of Conduct regarding Security Council action against genocide, crimes against humanity or war crimes calls on states not to vote against resolutions intended to prevent or end such crimes (Accountability, Coherence, and Transparency Group, 2015). This approach does not modify the formal authority of the Security Council, but it helps establish a political standard for the conduct of its members.

A further legal mechanism concerns the rule of mandatory abstention from voting, which is provided for in Article 27(3) of the UN Charter in relation to a party to a dispute. A. Kato (2025) argues that this provision could be applied more actively in cases where a member of the Security Council is itself a party to the dispute under consideration. This approach would not require the creation of a new legal rule; rather, it would involve a more consistent use of an existing provision of the Charter. The use of the veto in situations involving aggression raises an additional legal problem. Where a permanent member of the Security Council is itself an aggressor state, or has a direct interest in preventing a response to aggression, the exercise of the veto creates a tension between the procedural privileges of the P5 and fundamental principles of international law (Trahan, 2023).

The contemporary debate on the veto power therefore concentrates on practical mechanisms for reducing its negative effects. These include greater transparency, a requirement to explain the use of the veto, stronger involvement of the General Assembly, voluntary restraint in cases involving mass crimes, and increased political accountability of permanent members (Security Council Report, 2026). Accordingly, the veto power should be viewed as a systemic obstacle to effective Security Council reform. It affects not only the Council's ability to adopt decisions, but also the legitimacy of collective security and broader trust in international law. In these circumstances, the most realistic approach is not the immediate abolition of the veto, but the gradual reduction of its blocking effect. Such an approach may include the automatic consideration of veto cases by the General Assembly, voluntary abstention from the veto in situations involving mass crimes, more active application of the rule of mandatory abstention from voting, and stronger political accountability for permanent members of the Security Council. Reform of the UN Security Council is significant not only for the institutional structure of the United Nations, but also for the broader system of international law. Under the UN Charter, the Security Council bears primary responsibility for the maintenance of international peace and security, and its decisions may produce binding legal consequences for Member States. Therefore, changes to the Council's composition, procedures, or institutional practice may affect the legitimacy, effectiveness, and practical functioning of the international legal order, as shown in Table 3.

Table 3. Legal consequences of reforming the UN Security Council for international law

Direction of influence	Feature of consequence	Conditions and risks of implementation
Legitimacy of international law	A more representative Security Council could increase the perception of its decisions as fair and balanced	Enlargement alone does not guarantee legitimacy unless accompanied by transparency, accountability and real participation of states in decision-making
Collective system security	Reform could strengthen the capacity of international law to respond to aggression, mass crimes and threats to peace	The effect will be limited if the veto continues to block the Security Council's response to gross violations of international law
The role of the General Assemblies	In cases of Security Council blockages, the supporting and compensatory role of the General Assembly could be strengthened	The Unity for Peace mechanism (Tomuschat, 2008) and UN General Assembly resolution 76/262 do not replace the Security Council's powers, but these instruments strengthen political control over the use of the veto
Responsibility to Protect	Reform could increase the practical relevance of the international community's responsibility to respond to genocide, war crimes, ethnic cleansing and crimes against humanity	If the veto blocks decisions on mass crimes, the Responsibility to Protect concept remains limited in practical implementation
Limitation of use of veto	Voluntary veto abstention in cases of mass crimes could strengthen the link between the Security Council, international humanitarian law and international criminal law	Accountability, Coherence and Transparency Group does not change the UN Charter, but forms a political standard for state behaviour
Interpretation of the current norms of the UN Charter	A more active application of Article 27(3) of the UN Charter could limit the involvement of a state party to a dispute in blocking relevant decisions	Depends on wider acceptance of the practice of mandatory abstention

Table 3. Continued

Direction of influence	Feature of consequence	Conditions and risks of implementation
Reform without a complete revision of the Statute	Some of the changes could be implemented through the Council's working methods, political commitments, procedural practices and increased transparency	Does not completely eliminate structural problems, but is more realistic than formal change UN Charter

Source: compiled by the author based on United Nations Charter[1], United Nations General Assembly (2005; 2022), C. Tomuschat (2008), Code of Conduct Regarding Security Council Action Against Genocide, Crimes Against Humanity or War Crimes[2], J. Trahan (2023), M.A. Khalil & F. Lavaud (2024), A. Kato (2025), United Nations Security Council (n.d.b)

The legal impact of Security Council reform depends less on the formal enlargement of its membership than on changes in decision-making practice, the reduction of the veto's blocking effect, and the strengthening of transparency and accountability within the Council. A numerical increase in membership may improve representation, but it cannot by itself ensure greater effectiveness unless it is accompanied by procedural and institutional changes. For this reason, the legal implications of reform are multidimensional. They may strengthen the legitimacy of international law, reinforce the collective security system, and enhance the role of the General Assembly in situations where the Security Council is blocked. However, such effects can be achieved only through substantive reform rather than merely formal institutional expansion.

The example of North Macedonia illustrates why Security Council reform is relevant for small states that do not seek permanent membership but rely on a predictable international legal order, an accountable Security Council, and the equal application of international law. In her speech during the general debate of the 80th session of the UN General Assembly, the President of North Macedonia emphasised the need for a more democratic, accountable, responsible, and inclusive Security Council (Siljanovska-Davkova, 2025). A similar position is reflected in the EU statement joined by North Macedonia, which links Security Council reform to greater effectiveness, transparency, inclusiveness, and improved representation of underrepresented regions, particularly Africa (Delegation of the European Union…, 2025). For small states, therefore, the importance of reform lies not in the redistribution of permanent seats as such, but in strengthening the Council's capacity to act in accordance with the UN Charter, reducing the blocking effect of the veto, and preserving confidence in the international legal order.

Reform of the UN Security Council should be pursued as a phased process rather than as a single comprehensive transformation of the entire system. Its first priority should be to broaden the representation of underrepresented regions, including Africa, Latin America, Asia, and small states. At the same time, reform should not be reduced to the creation of additional permanent seats, since such an approach could merely expand the circle of privileged states without resolving the problem of the Council's effectiveness. A practical reform agenda should also include a stronger role for the General Assembly in cases where the veto is used, regular consideration of the reasons for and consequences of blocked Security Council decisions, and greater political accountability of permanent members. It would also be important to promote restraint in the use of the veto in situations involving mass crimes, including genocide, war crimes, and crimes against humanity, on the basis of political commitments by states. In addition, the rule of mandatory abstention should be applied more consistently where a member of the Security Council is a party to a dispute. Transparency and accountability should be treated as equally important priorities. This requires more open procedures, clearer explanations of state positions, a stronger role for non-permanent members, and mechanisms for monitoring the use of the veto. Security Council reform therefore has a dual character: it is legally possible within the framework of the UN Charter, but politically constrained by the privileged status of permanent members and the absence of consensus on the Council's future model. Its success depends on the ability of states to develop a compromise approach that combines broader representation, reduced negative effects of the veto, greater transparency and accountability, and a stronger role for the General Assembly.

Thus, the veto power also has systemic significance for the Security Council, as it influences

[1] United Nations Charter. (1945, June). Retrieved from https://www.un.org/en/about-us/un-charter/full-text.
[2] Code of Conduct Regarding Security Council Action Against Genocide, Crimes Against Humanity or War Crimes. (2015, December). Retrieved from https://www.globalr2p.org/resources/code-of-conduct-regarding-security-council-action-against-genocide-crimes-against-humanity-or-war-crimes/.

the voting procedure, the ability of the Council to respond to international crises, and the effectiveness of the legal response to those international crises. This conclusion correlates with the study by J. Gifkins (2021) on the decision-making process in the Security Council. The current study places an emphasis on the legal impact of the veto, specifically in relation to the effectiveness of the Security Council, the legitimacy of its decisions, and the trust that the international legal system places in its decisions. The results of the study revealed that one of the legal problems associated with the veto power is when a member of the Security Council that possesses the right to use the veto has an interest in the legal response to a conflict. This finding echoes the findings of Y. Okada (2023) that examines the use of the veto power within the context of international law in cases in which one of the permanent members of the Security Council becomes the aggressor in an international conflict. Overall, the results of the current study reveal that the legal contradiction between the special status of the permanent members of the Security Council and the effectiveness of the organisation as a whole to maintain international peace and security.

The complete abolition of the veto right in the near future is unlikely. The revision of the veto right depends on the consent of the members of the Security Council who are permanent. Within the framework of the study, the more realistic direction of the use of the veto right is the limitation of the negative consequences of the use of the veto right, in particular, the voluntary abstention from the veto in cases of mass crimes. This conclusion is correlated with the findings of the study by E. Staunton (2025) that investigated the formation of the norm not to use the veto and its impact on the Security Council. In a separate aspect of the research results, the relationship between the veto right of the members of the Security Council and the practical implementation of the Responsibility to Protect concept became apparent. The findings of the study reveal that the veto right of the Security Council members that enables them to block certain decisions in the case of mass crimes limits the practical implementation of the Responsibility to Protect concept. This finding is in agreement with the studies of A. Upadhyay & A. Mehrotra (2025) and B.D. Lepard (2021) that investigate the veto right as one of the factors that complicate the practical implementation of the Responsibility to Protect concept. Thus, comparing these studies with the results of this study enables the conclusion that the voluntary abstention from the use of the veto right in cases of mass crimes is an alternative to the revision of the UN Charter that could contribute to the reduction of the impact of the veto right in these specific situations.

M. Arcari (2022) examines the war in Ukraine through the lens of the difficulties of the international system's response to the war. T. Maluwa (2023) discusses how the war in Ukraine exemplifies the paralysis of the Security Council, leading to discussions of the need for reform of the Council. A. Peters (2023) researches the legal limits of the Russian veto in the context of the war in Ukraine. Each of these authors produced work that is relevant to the research that is performed in the current study. Each of these studies relate to the current study in that they discuss the issue of the veto in relation to the war in Ukraine – an issue that correlates with the findings of the current research study that the problem of the veto is systemic in nature. Furthermore, the fact that the legal problem associated with the veto is worsened when the permanent member of the Council also has an interest in blocking the legal response to the aggression that occurs is correlated with the findings of the current study. Thus, through comparing the work of each of these authors, it becomes possible to specify the findings of the current study in the context of the issue of aggression itself.

Another way to reduce the negative consequences of the veto power is to strengthen the role of the United Nations General Assembly (2022). The resolution of the United Nations General Assembly is important not as a means of redistributing powers between the General Assembly and the Security Council, but as a means of holding to account the actions of the permanent member that used the veto. In his work, P. Arrocha Olabuenaga (2023) considers the role of the General Assembly in holding debates after the use of the veto by the permanent members. Furthermore, the work of L. Di Gianfrancesco (2025) discusses how the Veto Initiative can be used as a means of strengthening the role of the General Assembly. Thus, the significance of the resolution of the United Nations General Assembly within the framework of this current study is that it does not alter the nature of the veto in the present Charter of the United Nations, but it does create an additional means of political accountability in response to the use of the veto. Thus, the veto right in the context of reforming the UN Security Council can be considered both as a means of providing voting power to the permanent members of the Security Council, but also as a factor that impacts the effectiveness of the legal response of the United Nations. Given the complexity of the proposal to abolish the use of the veto altogether, the consideration of existing means or new proposals to limit its negative consequences is of practical importance – to strengthen the role of the General Assembly, to hold the permanent members to account for their decisions, or to encourage them to voluntarily abstain from the use of the veto in cases of mass crimes or to more actively utilise the provisions of the UN Charter.

■ Conclusions

The study has shown that reform of the UN Security Council is not only a political issue, but also a complex legal process, since it is directly conditioned by the provisions of the UN Charter. The Charter makes reform legally possible, but at the same time restricts it through a demanding amendment procedure that requires the consent of the permanent members of the Security Council. Therefore, the main obstacle is not the absence of a legal mechanism, but the dependence of that mechanism on the states that benefit most from maintaining the existing institutional model. The veto power is central to this problem. It reinforces the privileged position of the P5 and may prevent the United Nations from responding effectively to international crises. The chronological analysis of the reform process shows that the renewal of the Security Council has remained on the UN agenda for a long period. However, negotiations remain incomplete because states have not developed a shared vision of the Council's future model. The comparison of key actors' positions confirms that states generally recognise the need for reform, but interpret its content differently. The G4 supports the expansion of permanent membership, the African Union emphasises the need to correct regional and historical injustice, while Uniting for Consensus opposes the creation of new permanent privileges. The positions of individual permanent members also demonstrate selective support for change: they accept the idea of broader representation, but do not show readiness to reconsider the powers attached to permanent membership. As a result, the main difficulty lies in the absence of consensus on a specific reform model. Strengthening the role of non-permanent members may therefore serve as a realistic way to improve representation and accountability without immediately revising the status of permanent members.

In terms of the legal consequences of reform, the study establishes that changes in the functioning of the Security Council affect not only the institutional structure of the United Nations, but also the legitimacy of international law and the effectiveness of the collective security system. The veto power has a systemic character, since it may block Council decisions and weaken confidence in the Council's ability to act in accordance with its mandate. For this reason, the most realistic approach is not the immediate abolition of the veto, but the gradual reduction of its negative effects through transparency, accountability, and political commitments by states. The blocking of the Security Council may be partly offset by a more active role for the General Assembly. Reform is therefore significant not only for major powers, but also for small states that depend on a predictable and fair international legal order. The example of North Macedonia demonstrates that, for small states, transparency, accountability, compliance with the UN Charter, and the equal application of international law are of particular importance. Effective reform should therefore be gradual and should combine broader representation, a stronger role for non-permanent members, political accountability for the use of the veto, greater transparency, and enhanced involvement of the General Assembly. Future research should focus on a comprehensive assessment of possible scenarios for Security Council reform, taking into account their legal validity, political acceptability for Member States, and potential impact on the effectiveness of the international legal mechanism for maintaining peace and security.

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Реформа Ради Безпеки ООН: правові та політичні виклики

Рілінда Макеллара Мехметі
Професор
Міністерство юстиції Північної Македонії
1000, вул. Димитрія Чуповського, 9, м. Скоп'є, Північна Македонія
https://orcid.org/0000-0002-9581-4140

■ **Анотація.** У цьому дослідженні розглянуто правові та політико-інституційні умови реформування Ради Безпеки ООН, проаналізовано значення такої реформи для міжнародного права та глобального врядування. Дослідження ґрунтувалося на формально-правових, історико-правових, порівняльних і проблемно орієнтованих правових методах. У дослідженні констатовано, що реформа Ради Безпеки має виразно політичний та правовий характер, оскільки будь-які зміни в складі Ради, статусі її членів або процедурах прийняття рішень мають відповідати Статуту Організації Об'єднаних Націй. Право вето залишається одним із головних обмежень ефективності Ради, оскільки воно дає змогу постійному члену заблокувати прийняття рішення навіть тоді, коли це рішення підтримує більшість. Процедура внесення поправок до Статуту також створює високий правовий поріг для реформи, оскільки вимагає ратифікації всіма постійними членами Ради Безпеки. Розширення складу Ради 1963 року продемонструвало, що інституційна реформа є юридично можливою, але також ілюструє обмеження реформи, яка не стосується статусу постійних членів або механізму вето. Дослідження засвідчило, що позиції «Групи чотирьох», яку утворюють Бразилія, Німеччина, Індія та Японія, Африканського союзу, коаліції «Об'єднані за консенсус», Великої Британії, Франції та Китаю відображають різні підходи до питань представництва, регіонального балансу й розподілу інституційних привілеїв. Правові наслідки реформи залежали не лише від розширення складу Ради Безпеки, а й від обмеження блокувального ефекту права вето, посилення прозорості та підвищення підзвітності постійних членів. Для малих держав, зокрема Північної Македонії, реформа була важливою як засіб підвищення передбачуваності міжнародного правового порядку та сприяння рівноправному застосуванню міжнародних правових норм. У дослідженні сформульовано висновок, що реформа Ради Безпеки є поступовим процесом, спрямованим на розширення представництва, обмеження використання права вето, підвищення підзвітності та зміцнення глобального врядування. Його практичне значення полягає в можливості використання отриманих результатів для розроблення експертних оцінок і рекомендацій щодо реформи Ради Безпеки, зменшення негативних наслідків права вето та підвищення ефективності діяльності Ради

■ **Ключові слова:** право вето; процедура голосування; процедурна підзвітність; глобальне врядування; регіональне представництво

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Institutional and legal mechanisms for environmental monitoring and control within the framework of the European Green Deal: A comparative analysis of EU and Ukrainian policies

Yevhenii Suietnov
PhD in Law, Associate Professor
Yaroslav Mudryi National Law University
61024, 77 Hryhoriia Skovorody Str., Kharkiv, Ukraine
https://orcid.org/0000-0002-4094-444X

Viktoriia Bredikhina
PhD in Law, Associate Professor
Yaroslav Mudryi National Law University
61024, 77 Hryhoriia Skovorody Str., Kharkiv, Ukraine
https://orcid.org/0000-0002-7983-1098

Olena Lozo*
PhD in Law, Associate Professor
Yaroslav Mudryi National Law University
61024, 77 Hryhoriia Skovorody Str., Kharkiv, Ukraine
https://orcid.org/0000-0002-2789-533X

Elbis Tulina
PhD in Law, Associate Professor
Yaroslav Mudryi National Law University
61024, 77 Hryhoriia Skovorody Str., Kharkiv, Ukraine
https://orcid.org/0000-0002-8780-5682

Olena Malokhlib
PhD in Law
Yaroslav Mudryi National Law University
61024, 77 Hryhoriia Skovorody Str., Kharkiv, Ukraine
https://orcid.org/0000-0003-3081-8076

■ **Abstract.** The study aimed to conduct a comparative analysis of the environmental monitoring and control mechanisms in the European Union and Ukraine, considering the current requirements of the European Green Deal. The study used formal-legal, institutional and comparative-legal methods to analyse regulatory framework for environmental monitoring and control, characteristics of institutional coordination in environmental governance, and compare environmental regulation models of the European Union and Ukraine. The study demonstrated that, within the framework of the European Green Deal, an integrated model of environmental governance has emerged, combining mechanisms for climate regulation, industrial environmental control, the digitalisation of environmental information, multi-level institutional coordination and the enforcement

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■ *Corresponding author (*lozoolena@gmail.com*)

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of environmental legislation. Five structural elements of this model have been identified, and the study established that the systems for monitoring, reporting and verifying greenhouse gas emissions, as well as the European Environment Information and Observation Network, ensure the integration of environmental data into procedures for climate planning, environmental risk assessment and supranational monitoring of compliance with climate commitments. The study has established that environmental monitoring in the European Union has evolved from a mechanism for identifying breaches of environmental legislation into a system of continuous regulatory oversight and assessment of the effectiveness of environmental policy. The study also found that the implementation of European environmental standards in Ukraine is accompanied by an expansion of environmental monitoring functions through the integration of environmental impact assessment procedures, strategic environmental assessment and the system for monitoring, reporting and verifying greenhouse gas emissions. The study determined that in Ukraine, environmental monitoring is predominantly used within the framework of control, reporting and permitting procedures, whereas in the European Union, monitoring results are integrated into mechanisms for strategic planning, environmental risk assessment and verification of compliance with climate commitments. The practical significance of the findings is determined by possible use of identified structural and functional differences between the European Union and Ukrainian models to further harmonise the Ukrainian environmental monitoring and control system with the European Union's *acquis communautaire* in the field of environmental protection

■ **Keywords:** environmental law; climate law; environmental policy; climate planning; environmental risk assessment; fulfilment of climate commitments; harmonisation of legislation

■ Introduction

The modern stage of societal development is defined by an increase in environmental risks linked to climate change, environmental pollution, the depletion of natural resources and the intensification of human impact on natural ecosystems. Under these circumstances, there is a pressing need to develop effective environmental monitoring and control systems that ensure the timely detection of adverse changes in the state of the environment, provide information to support management decisions, and monitor compliance with environmental requirements. For Ukraine, the issue of environmental monitoring and control is linked to the adaptation of the national environmental governance system to the European Union's *acquis communautaire* in the field of environmental protection and climate policy.

In academic discourse, implementation of the European Green Deal is viewed not as an environmental strategy of the European Union (EU), but as a comprehensive system of multi-level legal and institutional governance, combining mechanisms for monitoring, oversight, policy coordination and supranational regulation. Thus, N. Bruch *et al.* (2024) concluded that traditional mechanisms of "soft" environmental regulation within the EU do not ensure an adequate level of implementation of the European Green Deal's climate targets. The researchers found that strengthening the role of EU regulations and expanding the system of indicators to monitor Member States' compliance with environmental obligations has become one of the trends in the transformation of European environmental policy. Furthermore, the authors emphasised the need to integrate environmental monitoring systems into strategic planning and inter-institutional cooperation processes, thereby ensuring more effective monitoring of progress towards climate targets. P. Graziano (2024) highlighted that EU environmental policy is gradually evolving into a component of a broader socio-environmental regulatory model. The author argued that the EU's climate initiatives are combined with social support mechanisms for the population and regions most affected by the environmental transition. The study established that environmental monitoring within the framework of the European Green Deal not only serves to monitor the state of the environment but also can also be used for assessment of the social consequences of environmental reforms, as well as their impact on employment, energy security and regional development. The issues surrounding multi-level governance and the practical implementation of the European Green Deal were explored by L. Sandmann *et al.* (2024). The researchers found that the effectiveness of EU environmental policy depends to a large extent on the coordination of actions between supranational, national and local institutions. The authors highlighted those difficulties arise not during the formulation of climate strategies, but at the stage of adapting them to the needs of individual territories and communities. At the same time, the study demonstrated that mechanisms for a just green transition require constant institutional oversight and monitoring, as disparities in the socio-economic development of regions can exacerbate the risks of fragmentation in the EU's environmental policy.

A. Testi *et al.* (2023) have contributed to research on the local-level implementation of the European Green Deal. The researchers argued that the effectiveness of environmental policy depends on the participation of local communities in

decision-making processes and the assessment of environmental risks. The study demonstrated that engaging the public in environmental governance improves the effectiveness of environmental protection measures and can tailor climate decisions to specific characteristics of individual territories. The study also emphasised that modern environmental monitoring systems must consider not only environmental indicators, but also the social, economic and spatial characteristics of regional development. A separate strand of current research concerns the political controversies associated with the implementation of EU climate policy in the countries of Central and Eastern Europe. B. Witajewska-Baltvilka *et al.* (2024) found that the politicisation of climate reforms directly affects the pace of implementation of the European Green Deal mechanisms. The authors concluded that differences in the levels of economic development among Member States create unequal attitudes towards the EU's climate goals, with the result that environmental reforms are met with political resistance. The researchers also emphasised that, for countries in Central and Eastern Europe, the green transition is linked to issues of energy security, economic stability and social support for the population.

The Ukrainian dimension of the harmonisation of environmental policy with EU law is examined by O. Ivanchuk (2025). The author found that the adaptation of Ukraine's environmental legislation to European standards is characterised by an uneven and piecemeal implementation of individual directives. According to the study's findings, difficulties arise in institutional arrangements for environmental monitoring and state control due to insufficient coordination between government bodies. At the same time, it is emphasised that Ukraine's further integration into the European environmental space requires a shift from the formal approximation of legislation to the creation of a comprehensive environmental governance system. The issues surrounding the interconnection between environmental transformation and sustainable development were explored by V. Bondarenko *et al.* (2023). Based on a comparison of international and Ukrainian experience, the researchers concluded that the development of a "green" economy is impossible without the effective functioning of environmental monitoring and state control systems. The authors emphasised that EU countries demonstrate a higher level of integration of environmental indicators into economic planning processes, whereas in Ukraine, environmental control is not yet sufficiently integrated into the strategic management system. In the context of the war and European integration, research into the legal aspects of Ukraine's environmental and energy transition is becoming increasingly relevant. In particular, I. Yakushev *et al.* (2026) found that military risks complicate the implementation of climate and energy reforms, whilst at the same time reinforcing the need to align Ukrainian policy with EU requirements. The researchers concluded that Ukraine's post-war recovery is increasingly guided by the principles of the European Green Deal, and that environmental monitoring is regarded as one of the fundamental tools for ensuring the country's sustainable development and energy security.

Despite substantial research, studies have insufficiently addressed a comprehensive comparative assessment of institutional and legal mechanisms for environmental monitoring and control in the EU and Ukraine, specifically in the context of implementing the European Green Deal. Existing studies prioritise either general aspects of EU climate policy or specific areas of harmonisation of environmental legislation. At the same time, issues of inter-institutional coordination and the integration of monitoring systems into the EU's environmental governance mechanisms remain under-researched.

The study aimed to conduct a comparative analysis of the institutional and legal mechanisms for environmental monitoring and control in the EU and Ukraine in the context of implementing the European Green Deal. The objectives of the study were: to analyse the legal and institutional instruments for implementing EU environmental policy within the framework of the European Green Deal; to examine the specific features of the implementation of European environmental standards in Ukraine; and to identify areas for harmonising Ukrainian legislation with EU law.

Materials and Methods

This study is of a comparative legal nature. The chronological scope of the study covers the period 2007-2025. The lower limit is determined by the start of the development of an integrated digital system for environmental governance in the European Union, the development of mechanisms for the exchange of environmental information, and the transition to the use of spatial environmental data in monitoring and environmental control procedures. The upper limit relates to the analysis of the current stage of transformation of environmental policy in the EU and Ukraine in the context of the implementation of the European Green Deal, the development of systems for monitoring, reporting and verifying greenhouse gas emissions, and the digitalisation of environmental control.

The subject of this comparative analysis is the institutional and legal mechanisms for environmental monitoring and control in the EU and Ukraine. The choice of Ukraine is due to the process of harmonising national legislation with the European Union's

body of environmental law in the field of environmental protection[1].

For a comparative analysis of the implementation of EU environmental policy, the experiences of Germany, France, Poland and the Netherlands were examined. These countries were selected due to differences in their models of environmental governance, the level of digitalisation of environmental monitoring, the structure of institutional coordination, and practices regarding the implementation of EU environmental legislation. Germany represents a federal model of environmental control; France, an integrated system of environmental and climate planning; Poland, a Central and Eastern European model facing challenges in the regional coordination of environmental control; and the Netherlands, a high level of digitalisation of environmental monitoring and integration of environmental information systems. The comparative analysis was conducted based on following criteria: the organisation of the environmental control system; the use of digital monitoring tools; the specifics of implementing the requirements of Directive No. 2010/75/EU of the European Parliament and of the Council "On Industrial Emissions (Integrated Pollution Prevention and Control) (Recast) (Text with EEA Relevance)"[2]; the use of environmental data in the management decision-making process; problem areas in the implementation of environmental legislation, as identified by the Environmental Implementation Review (Directorate-General for the Environment, 2025); and the nature of interaction between national authorities and the EU's supranational environmental governance mechanisms. The source base for the comparative analysis also comprised information materials from the European Environment Information and Observation Network (n.d.), which were used to describe the organisational and information mechanisms for environmental monitoring in EU Member States.

To examine the regulatory mechanisms for implementing the EU's environmental policy, the formal-legal method was applied with the aim of analysing the structure, content and specific features of the legal regulation of environmental monitoring, climate policy, industrial environmental control and mechanisms for ensuring compliance with EU environmental legislation. The research drew on European Union legislative acts governing various aspects of environmental governance. To examine the legal foundations for the implementation of the European Green Deal and climate regulation, the following were used: the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions "The European Green Deal"[3] and Regulation (EU) No 2021/1119 of the European Parliament and of the Council "Establishing the Framework for Achieving Climate Neutrality and Amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ("European Climate Law")[4] were used to examine the legal foundations for the implementation of the European Green Deal and climate regulation. The analysis of industrial environmental control mechanisms and the digitalisation of environmental information was conducted based on Directive No. 2010/75/EU of the European Parliament and of the Council[5] and Directive No. 2007/2/EC of the European Parliament and of the Council "Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)"[6]. Directive (EU) No. 2024/1203 of the European Parliament and of the Council "On the Protection of the Environment Through Criminal Law and Replacing Directives 2008/99/EC and 2009/123/EC" was used to examine the mechanisms of legal liability and to ensure compliance with environmental legislation[7].

[1] Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part. (2014, June). Retrieved from https://www.consilium.europa.eu/en/documents/treaties-agreements/agreement/?id=2014045.

[2] Directive No. 2010/75/EU of the European Parliament and of the Council "On Industrial Emissions (Integrated Pollution Prevention and Control) (Recast) (Text with EEA Relevance)". (2010, November). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075.

[3] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions "The European Green Deal". (2019, December). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640.

[4] Regulation (EU) No. 2021/1119 of the European Parliament and of the Council "Establishing the Framework for Achieving Climate Neutrality and Amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ("European Climate Law"). (2021, June). Retrieved from https://eur-lex.europa.eu/eli/reg/2021/1119/oj.

[5] Directive No. 2010/75/EU of the European Parliament and of the Council "On Industrial Emissions (Integrated Pollution Prevention and Control) (Recast) (Text with EEA Relevance)". (2010, November). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075.

[6] Directive No. 2007/2/EC of the European Parliament and of the Council "Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)". (2007, March). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32007L0002.

[7] Directive (EU) No. 2024/1203 of the European Parliament and of the Council "On the Protection of the Environment Through Criminal Law and Replacing Directives 2008/99/EC and 2009/123/EC". (2024, April). Retrieved from https://eur-lex.europa.eu/eli/dir/2024/1203/oj.

The institutional approach was applied to examine the system of division of powers and coordination of activities between the European Commission, the Directorate-General for the Environment, the European Environment Agency, the European Environment Information and Observation Network, the Ministry of Economy, Environment and Agriculture of Ukraine, the State Environmental Inspectorate of Ukraine, the State Agency for Water Resources of Ukraine and the State Agency for Forest Resources of Ukraine in the field of environmental monitoring and control. The research drew on the following analytical documents: the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "Environmental Implementation Review 2022: Turning the Tide Through Environmental Compliance"[1] and "Environmental Implementation Review 2025" (Directorate-General for the Environment, 2025), which were used to analyse mechanisms for coordinating environmental policy, ensuring compliance with environmental legislation, and the interaction between EU institutions and Member States in the field of environmental governance. The analytical report "Europe's Environment 2025" (European Environment Agency, 2025) was used to examine the institutional mechanisms for environmental monitoring, the digitalisation of environmental information and trends in the development of EU environmental policy.

The comparative legal method has been applied to compare the regulatory and institutional models of environmental monitoring and control in the European Union and Ukraine according to the following criteria: the regulatory model of environmental regulation, the functional purpose of environmental monitoring, the institutional structure of environmental governance, the digitalisation of environmental monitoring, the system for monitoring, reporting and verifying greenhouse gas emissions, mechanisms for ensuring compliance with environmental legislation, and the integration of environmental information into the public administration system. The research materials used to analyse the legal framework for environmental regulation in Ukraine were Law of Ukraine No. 1264-XII "On Environmental Protection"[2] and Law of Ukraine No. 2059-VIII "On Environmental Impact Assessment"[3], which were used to examine the legal mechanisms of environmental control, environmental impact assessment and the functioning of the environmental monitoring system. To analyse the integration of environmental procedures into the strategic planning system, Law of Ukraine No. 2354-VIII "On Strategic Environmental Assessment"[4] was applied; its provisions were used to examine the mechanisms for incorporating environmental criteria into state planning processes and management decision-making. The study of the system for monitoring, reporting and verifying greenhouse gas emissions was conducted based on Law of Ukraine No. 377-IX "On the Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions"[5], which stipulates the legal framework for the operation of the Monitoring, Reporting and Verification (MRV) system in Ukraine and its adaptation to the European Union's climate mechanisms. To develop practical recommendations, the legal modelling method was applied; this was used to identify opportunities for adapting specific elements of environmental governance in EU Member States to the national environmental monitoring and control system.

Results

Institutional and legal mechanisms for implementing EU environmental policy within the framework of the European Green Deal. The European Green Deal initiated a shift in approaches to shaping the European Union's environmental policy by integrating climate and environmental requirements into the EU's economic and legal regulatory framework. An analysis of the content of the European Green Deal[6], shows that, within the framework of this strategy, environmental policy is viewed not as a separate sector of public administration, but as a cross-sectoral regulatory mechanism covering industry, energy, transport, agriculture, the financial system and the EU's digital infrastructure. The document defines the achievement

[1] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Environmental Implementation Review 2022: Turning the Tide Through Environmental Compliance". (2022, September). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52022DC0438.

[2] Law of Ukraine No. 1264-XII "On Environmental Protection". (1991, June). Retrieved from https://zakon.rada.gov.ua/laws/show/en/1264-12#Text.

[3] Law of Ukraine No. 2059-VIII "On Environmental Impact Assessment". (2017, May). Retrieved from https://zakon.rada.gov.ua/laws/show/en/2059-19#Text.

[4] Law of Ukraine No. 2354-VIII "On Strategic Environmental Assessment". (2018, March). Retrieved from https://zakon.rada.gov.ua/laws/show/en/2354-19#Text.

[5] Law of Ukraine No. 377-IX "On the Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions". (2019, December). Retrieved from https://zakon.rada.gov.ua/laws/show/377-20#Text.

[6] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions "The European Green Deal". (2019, December). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640.

of climate neutrality by 2050 as a legally and institutionally mandated direction for the Union's development, the implementation of which requires a restructuring of the mechanisms for monitoring, controlling and evaluating Member States' fulfilment of their environmental obligations.

Following the adoption of the European Green Deal, environmental regulation in the EU has become more integrated, as evidenced by the combination of climate policy with mechanisms for regulating industry, energy, transport and agriculture (Hereu-Morales *et al.*, 2024; Sandri *et al.*, 2025). This transformation is related to the enshrinement of the concept of climate regulation in EU law and the transition to a model of economic decarbonisation, which envisages a systematic reduction in greenhouse gas emissions across all sectors of economic activity. The European Green Deal has shaped a new regulatory model, within which environmental objectives are integrated into the EU's financial, industrial and investment policies, whilst environmental legislation is beginning to serve as a structural framework for economic transformation (Olczyk & Kuc-Czarnecka, 2025; Calliess, 2026).

An analysis of the regulatory framework of the European Green Deal shows that the EU's environmental monitoring and control system is shaped by a combination of regulations, directives, reporting mechanisms and procedures for verifying compliance with climate commitments. The relationship between the provisions of Regulation (EU) No 2021/1119 of the European Parliament and of the Council[1] and the climate reporting mechanisms demonstrate a shift in the function of environmental monitoring under EU law: the collection of environmental data is being integrated into the mechanism for assessing Member States' compliance with their climate commitments. The Regulation establishes not only a legally binding target of climate neutrality, but also procedures for periodically assessing Member States' progress in reducing greenhouse gas emissions. Consequently, environmental reporting is used by the European Commission as a regulatory compliance tool, ensuring that national policies align with the EU's decarbonisation targets.

The interplay between monitoring mechanisms and industrial regulation is evident in the provisions of Directive No. 2010/75/EU of the European Parliament and of the Council[2]. The combination of authorisation procedures, standardised monitoring methods, automated emission measurement and regular environmental reporting demonstrates the integration of environmental control into the system of ongoing regulatory oversight of industrial activities. This regulatory framework transforms the function of environmental control: its application is geared not only towards identifying breaches of environmental legislation, but also towards the continuous monitoring of the extent to which production impacts the environment. As a result, the monitoring of industrial emissions has become an integral part of the mechanism for managing environmental risks in the EU's industrial sector (Dupont *et al.*, 2020).

Operation of the MRV system demonstrates the integration of procedures for monitoring, reporting and verifying environmental indicators into a supranational climate governance mechanism. The use of uniform standards for the collection and verification of data on greenhouse gas emissions ensures the comparability of climate indicators between Member States and the standardisation of procedures for assessing compliance with climate commitments. The interconnection between the Monitoring Mechanism Regulation and the MRV system indicates that environmental information, within the framework of the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions "The European Green Deal"[3], is used not only for statistical purposes but also as a tool for assessing the effectiveness of national climate policy. This forms a model for ensuring compliance with environmental requirements, within which monitoring results directly influence the mechanisms for monitoring Member States' fulfilment of their environmental commitments.

Transformation of the environmental governance system in the EU is accompanied by the integration of digital mechanisms for managing environmental information. The provisions of Directive No. 2007/2/EC of the European Parliament and of the Council[4] have established the legal framework for the harmonisation of spatial environmental data

[1] Regulation (EU) No. 2021/1119 of the European Parliament and of the Council "Establishing the Framework for Achieving Climate Neutrality and Amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ("European Climate Law"). (2021, June). Retrieved from https://eur-lex.europa.eu/eli/reg/2021/1119/oj.

[2] Directive No. 2010/75/EU of the European Parliament and of the Council "On Industrial Emissions (Integrated Pollution Prevention and Control) (Recast) (Text with EEA Relevance)". (2010, November). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075.

[3] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions "The European Green Deal". (2019, December). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640.

[4] Directive No. 2007/2/EC of the European Parliament and of the Council "Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)". (2007, March). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32007L0002.

and for ensuring the interoperability of Member States' national information systems. The interrelation between mechanisms for the digital exchange of environmental information and environmental monitoring procedures indicates the emergence of an integrated environmental governance system based on the use of environmental data. Within this model, digital environmental data is used in procedures for environmental risk assessment, climate planning, ensuring compliance with environmental legislation, and verifying adherence to environmental obligations. This highlights a shift in the functional significance of environmental information within the EU legal system: environmental data is being integrated into mechanisms for regulatory decision-making and supranational oversight.

An analysis of the provisions of Directive (EU) No. 2024/1203 of the European Parliament and of the Council[1] reveals a strengthening of the link between the environmental monitoring system and the mechanisms of legal liability under EU law. The expansion of the list of environmental offences is accompanied by an increased emphasis on procedures for identifying, documenting and recording environmental infringements, which integrates mechanisms for ensuring compliance with environmental legislation with digital monitoring and environmental reporting systems. The combination of control procedures, environmental data verification, digital monitoring and liability mechanisms forms a comprehensive system for ensuring environmental compliance, within which legal, digital and institutional tools are used to achieve the European Union's climate and environmental objectives.

The institutional framework for implementing the EU's environmental policy is based on the division of coordination, monitoring and enforcement powers between supranational and national bodies (Rivas *et al.*, 2021). This model ensures a combination of centralised monitoring of the implementation of climate and environmental targets with a decentralised mechanism for the practical application of environmental legislation by Member States. The balance of powers between EU institutions in the field of environmental oversight reflects the development of a system of multi-level environmental governance, within which mechanisms for monitoring, reporting and evaluating the fulfilment of environmental obligations are integrated into supranational regulatory oversight procedures.

The European Commission (n.d.a) coordinates the EU's environmental governance system, overseeing the implementation of the EU's environmental acquis and assessing the compliance of Member States' national policies with the Union's climate and environmental objectives. The European Commission's powers are exercised through the Environmental Implementation Review mechanism, infringement proceedings for breaches of EU law, and a system of periodic assessments of the implementation of environmental legislation. The interaction of these instruments demonstrates that the Commission's functions extend beyond the coordination of environmental policy and include elements of ongoing supranational oversight of Member States' compliance with their environmental obligations.

The Directorate-General for Environment is responsible for coordinating environmental policy; its activities ensure coordination between the legislative, enforcement and analytical mechanisms of EU environmental regulation (European Commission, n.d.b). The relationship between the powers of the Directorate-General for Environment and the mechanisms for ensuring compliance with environmental legislation indicates that environmental oversight within the EU functions not merely as a system for responding to infringements, but as a mechanism for the ongoing monitoring of environmental policy implementation. The Directorate-General for Environment coordinates the processes of drafting environmental legislation, establishing monitoring criteria, assessing the state of implementation of environmental acts, and facilitating interaction between EU institutions and the national authorities of Member States. This approach ensures the integration of monitoring and environmental reporting procedures into the regulatory decision-making process at EU level.

Operation of the environmental monitoring system in the EU is based on the work of the European Environment Agency (n.d.) and the European Environment Information and Observation Network (n.d.), which ensure the collection, organisation, standardisation and dissemination of environmental information amongst Member States. The European Environment Agency's interaction with national information networks demonstrates that environmental data in EU law serves not only an informational but also a regulatory function. The European Environment Information and Observation Network ensures the harmonisation of environmental indicators, the standardisation of data collection procedures and the interoperability of national monitoring systems, thereby enabling supranational comparisons of environmental indicators. This forms a unified digital infrastructure for environmental monitoring, within which the results of environmental monitoring are integrated into procedures

[1] Directive (EU) No. 2024/1203 of the European Parliament and of the Council "On the Protection of the Environment Through Criminal Law and Replacing Directives 2008/99/EC and 2009/123/EC". (2024, April). Retrieved from https://eur-lex.europa.eu/eli/dir/2024/1203/oj.

for climate planning, environmental reporting and the assessment of the effectiveness of Member States' environmental policies (Gløersen *et al.*, 2022; Wang, 2022).

Mechanisms of interaction between supranational and national institutions in the field of environmental control operate based on the principle of multi-level governance. This model provides for a division of coordination and supervisory functions between EU institutions and the authorities of Member States (Leshchukh *et al.*, 2025). Supranational bodies ensure the establishment of uniform standards for monitoring, environmental reporting and the assessment of compliance with environmental legislation, whilst national environmental inspectorates conduct direct monitoring of compliance with environmental protection requirements by economic operators. The balance of these powers reflects the integration of national environmental control mechanisms into a single EU environmental compliance system, within which the results of national monitoring are used for supranational assessment of the effectiveness of environmental governance.

An overview of the regulatory, legal and institutional mechanisms for implementing EU environmental policy shows that, within the framework of the European Green Deal, a comprehensive model of environmental governance has emerged, in which mechanisms for monitoring, reporting, control and enforcement are integrated into the system for achieving the European Union's climate and environmental objectives. The analysis demonstrated that the functioning of this model is based on a combination of legally binding climate targets, the digitalisation of environmental monitoring, multi-level institutional coordination and procedures to ensure compliance with environmental legislation. As a result, environmental control in the EU is becoming a form of continuous regulatory oversight, within which environmental information is used not only to record the state of the environment, but also to assess the effectiveness of public policy, verify compliance with climate commitments and apply mechanisms of legal liability (Table 1).

Table 1. Structural characteristics of the EU's environmental governance model within the framework of the European Green Deal

Structural element of the model	Features of how EU operates	Mechanism for integration into the environmental governance system	Regulatory outcome
Climate legislation	Climate targets are established in legally binding European Union legislation and integrated into industrial, energy, transport and agricultural policies	Combination of the European Climate Law, the MRV system, and climate reporting mechanisms	Transformation of environmental monitoring into assessment of Member States' compliance with their climate commitments
Industrial environmental monitoring	Control of industrial emissions is based on continuous monitoring, automated measurement of emissions and regular environmental reporting	Integration of licensing procedures, standardised monitoring methods and digital environmental control systems	Shift from responding to environmental breaches to a system of continuous regulatory oversight
Digitalisation of environmental governance	Environmental data is used in procedures relating to planning, monitoring, environmental risk assessment and verification of compliance with environmental obligations	Operation of the Infrastructure for Spatial Information in the European Community (INSPIRE) and the European Environment Information and Observation Network (EIONET)	Development of an environmental governance system based on the integrated use of digital environmental data
Institutional coordination	Supranational and national bodies operate within a multi-level system of environmental control	Cooperation between the European Commission, the Directorate-General for the Environment, the European Environment Agency and national environmental inspectorates	Combination of centralised monitoring with decentralised law enforcement
Implementation of environmental legislation	Compliance with environmental requirements is ensured through a combination of monitoring, reporting, verification and legal liability mechanisms	Integration of the Environmental Implementation Review, infringement proceedings under EU law and the Environmental Crime Directive	Strengthening supranational oversight of the implementation of the European Union's environmental acquis

Source: compiled by the authors

Analysis of the structural elements of the EU's environmental governance model leads to the conclusion that its functioning is based on the integration of legal, institutional and digital mechanisms for environmental control. In contrast to sectoral models of environmental regulation, the EU system focuses on the continuous combination of monitoring procedures, environmental reporting, data verification and enforcement mechanisms within a single regulatory oversight system. The analysis demonstrated that the European model is characterised by a high level of regulatory detail, the operation of a multi-level coordination system, the digitalisation of environmental monitoring and the integration of environmental information into management decision-making procedures. Despite the

existence of a single regulatory framework within the European Union, the practical implementation of environmental legislation varies across Member States. This is due to differences in administrative and territorial organisation, the level of digitalisation of environmental monitoring, the organisation of control procedures, and the institutional capacity of public administration bodies (Table 2).

Table 2. Comparative analysis of the implementation of environmental legislation in EU Member States

Comparison criteria	Germany	France	The Netherlands	Poland
Organisation of an environmental monitoring system	Supervision is performed by authorities of the federal states within the framework of a decentralised management model	Coordination is ensured by central government bodies through environmental and climate planning system	Monitoring is conducted at national and regional levels, with involvement of specialised water and environmental protection agencies	Monitoring is conducted by central and provincial environmental supervision authorities
Integration of digital monitoring tools	Integrated federal and state environmental monitoring information systems are used	Digital systems are used to monitor climate indicators, industrial emissions and implement environmental programmes	Some environmental data is collected and transmitted automatically via integrated digital platforms	Digitalisation processes are progressing at varying rates depending on the region and the area of environmental monitoring
Implementation of requirements of Directive No. 2010/75/EU of the European Parliament and of the Council[1]	Monitoring emphasises large industrial plants using standardised monitoring procedures	Requirements of the directive were incorporated into the system of environmental permits and climate regulation	Monitoring of industrial emissions is combined with the management of natural resource use and spatial planning	Attention is devoted to modernisation of procedures for monitoring industrial emissions in line with EU requirements
Use of environmental data in management decision-making	Monitoring data are used at federal and state levels in environmental planning	Results of monitoring are incorporated into national and regional climate programmes	Data is used to assess environmental risks, manage water resources and conduct spatial planning	Use of data is expanding as the national system is adapted to meet EU requirements
Areas of concern identified by the Environmental Implementation Review	Reduction of emissions in the transport sector and restoration of biodiversity	Waste management and biodiversity conservation	Reduction of nitrogen load on ecosystems and achievement of climate targets	Air quality, waste management and institutional coordination
Features of engagement with the EU's supranational mechanisms	Integration of federal bodies with the EU's environmental reporting systems	Use of EU climate planning and reporting mechanisms	Integration of national information systems with EIONET and INSPIRE	Strengthening the integration of national monitoring procedures with EU requirements as part of the ongoing implementation of the Union's environmental acquis

Source: compiled by the authors based on Directorate-General for Environment (2025), Organisation for Economic Co-operation and Development (2025), European Environment Information and Observation Network (n.d.)

A comparative analysis shows that environmental legislation in EU Member States is implemented within a single regulatory framework; however, the practical mechanisms for its implementation vary depending on the specific features of each country's model of public administration. Differences can be observed in the organisation of environmental oversight and the level of digitalisation of monitoring procedures. Germany operates a decentralised model of environmental governance, under which supervisory powers are vested in the authorities of the federal states. France, by contrast, is characterised by a centralised system of environmental policy coordination, which ensures a link between climate planning and environmental control mechanisms. The Netherlands demonstrates a high level of integration of environmental monitoring with digital platforms for natural resource management, whilst Poland continues to adapt its national environmental control system to the requirements of the European Union's environmental acquis. The comparison also showed that the effectiveness of environmental policy

[1] Directive No. 2010/75/EU of the European Parliament and of the Council "On Industrial Emissions (Integrated Pollution Prevention and Control) (Recast) (Text with EEA Relevance)". (2010, November). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075.

implementation is determined not so much by the content of environmental legislation – which is common to all Member States – as by the institutional capacity of public authorities to ensure its enforcement. A comparative analysis has shown that the countries studied differ in terms of the level of digitalisation of monitoring procedures, the nature of inter-agency coordination, the degree of integration of national information systems with European environmental data exchange networks, and the practice of using monitoring results in the management decision-making process. These factors determine the speed at which environmental risks are identified, the effectiveness of monitoring compliance with environmental protection requirements, and the extent to which climate targets are met.

At the same time, the findings of the Environmental Implementation Review 2025 (Directorate-General for the Environment, 2025) confirm that there is no one-size-fits-all model of environmental governance within the European Union. Each of the countries studied is characterised by specific challenges in implementing environmental policy, linked to the particularities of its economic structure, natural resource potential and the administrative organisation of public governance. This indicates that the effective implementation of environmental legislation requires a combination of standardised EU legal requirements with national institutional mechanisms for their implementation. The experience of Germany, France, the Netherlands and Poland demonstrates that the key conditions for an effective environmental policy are the integration of digital technologies into the monitoring system, proper coordination between levels of government, and the use of environmental data as a tool for ongoing regulatory oversight.

Implementation of European environmental standards in Ukraine's environmental monitoring and control system. The transformation of Ukraine's environmental policy is linked to the fulfilment of the obligations stipulated in the Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part[1]. An analysis of the provisions of Chapter 6, "Environment", of the Association Agreement shows that the implementation of European environmental standards encompasses not only the harmonisation of environmental legislation, but also the reform of mechanisms for environmental monitoring, environmental reporting and state control. Among the areas of cooperation, specific attention is given to air quality, waste management, industrial pollution, climate change and access to environmental information, which entails adapting national monitoring procedures to EU approaches. As a result, environmental monitoring is being integrated into the system for fulfilling Ukraine's international and European integration commitments.

An analysis of the regulatory framework for environmental control established following the adoption of Law of Ukraine No. 1264-XII[2] shows that the system of state environmental control was geared towards conducting inspections, recording breaches of environmental legislation and imposing administrative sanctions. This model is evident in the structure of the supervisory powers of state bodies and the mechanisms of legal liability for breaches of environmental legislation. Following the conclusion of the Association Agreement between Ukraine and the EU, the implementation of environmental impact assessment procedures, strategic environmental assessment and the MRV system has expanded the functions of environmental monitoring beyond administrative and supervisory activities. Differences between the EU and Ukrainian models can be seen in the functional significance of environmental information within the environmental governance system. In the EU, the results of environmental monitoring are integrated into mechanisms for climate planning, environmental risk assessment and supranational regulatory control. In Ukraine, environmental information is used within the framework of permitting procedures, state reporting and the supervisory activities of individual executive bodies, which results in fragmented environmental monitoring mechanisms and limits the integration of environmental data into the strategic planning system (Kornieiev, 2021).

The transposition of EU environmental law procedures into Ukrainian legislation has been accompanied by a partial expansion of environmental monitoring functions and the gradual use of environmental information in state planning and environmental risk assessment procedures. The adoption of Law of Ukraine No. 2059-VIII[3] and Law of Ukraine No. 2354-VIII[4] has integrated into national legislation

[1] Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part. (2014, June). Retrieved from https://www.consilium.europa.eu/en/documents/treaties-agreements/agreement/?id=2014045.
[2] Law of Ukraine No. 1264-XII "On Environmental Protection". (1991, June). Retrieved from https://zakon.rada.gov.ua/laws/show/en/1264-12#Text.
[3] Law of Ukraine No. 2059-VIII "On Environmental Impact Assessment". (2017, May). Retrieved from https://zakon.rada.gov.ua/laws/show/en/2059-19#Text.
[4] Law of Ukraine No. 2354-VIII "On Strategic Environmental Assessment". (2018, March). Retrieved from https://zakon.rada.gov.ua/laws/show/en/2354-19#Text.

mechanisms for environmental risk assessment, analysis of the impact of planned activities on the environment, and the consideration of environmental factors during the preparation of public planning documents. In contrast to a model of environmental control focused primarily on identifying breaches after economic activities have commenced, the procedures for environmental impact assessment and strategic environmental assessment provide for the use of environmental monitoring results at the stage of management decision-making. This alters the functional significance of environmental information within the system of state regulation and partially integrates the preventive mechanisms of environmental control characteristic of EU law. At the same time, an analysis of regulatory frameworks shows that procedures for environmental impact assessment, strategic environmental assessment, state environmental monitoring and the permitting process operate within different administrative mechanisms. Lack of a unified coordination system between these procedures limits the integration of environmental monitoring results into strategic planning and state environmental control mechanisms. This is associated with the division of powers amongst government bodies responsible for environmental protection. The Ministry of Economy, Environment and Agriculture of Ukraine (n.d.) and the State Environmental Inspectorate of Ukraine (n.d.) are responsible for formulating and implementing state environmental policy, as well as conducting supervisory functions. Monitoring of specific environmental components is entrusted to specialised bodies, in particular the State Agency of Water Resources of Ukraine (n.d.) and the State Forest Resources Agency of Ukraine (n.d.).

Differences between the EU and Ukrainian models are also evident in climate regulation. In the European Union, the MRV system is used for the standardised collection, verification and comparison of data on greenhouse gas emissions from Member States and is integrated into procedures for assessing compliance with climate commitments, preparing national energy and climate plans, and supranational climate monitoring. In Ukraine, mechanisms for monitoring, reporting and verifying greenhouse gas emissions were introduced by Law of Ukraine No. 377-IX[1] as part of the adaptation of national legislation to the EU's climate acquis. An analysis of the provisions of this Law shows that the functioning of the Ukrainian MRV system focuses on administering reporting by installation operators, verifying emissions data and establishing a national database on greenhouse gases. In contrast to EU model, the results of the Ukrainian MRV system have not yet been integrated into mechanisms for assessing the effectiveness of climate policy, strategic planning procedures or the state environmental control system. This highlights differences in the functional significance of climate monitoring within the environmental governance systems of the EU and Ukraine.

A comparative analysis of the digitalisation of environmental monitoring highlights differences in the functional significance of digital environmental data within the environmental governance systems of the EU and Ukraine. In the EU, digital platforms for environmental information are used in procedures for assessing environmental risks, monitoring compliance with climate commitments, preparing regulatory decisions and verifying Member States' environmental reporting. This ensures interconnectivity between monitoring systems, climate planning and regulatory control mechanisms.

In Ukraine, digitalisation of environmental monitoring is related to the operation of the EcoSystem Environmental Platform (n.d.), the Unified Register for Environmental Impact Assessment (n.d.), electronic services in the field of waste management, and environmental reporting systems. An analysis of how these information resources operate shows that their purpose centres on the electronic administration of environmental procedures, ensuring access to environmental information and the compilation of state registers. The use of digital environmental data in environmental risk assessment, strategic planning and state environmental control procedures is sector-specific and takes place within the framework of individual administrative mechanisms. This indicates varying degrees of integration of digital monitoring systems into the environmental governance mechanisms of the EU and Ukraine.

A comparison of environmental policy implementation practices in Germany, France, the Netherlands and Poland revealed differences in the organisation of environmental control, the use of digital monitoring tools and the integration of environmental information into public administration processes. At the same time, the results of the analysis indicate that certain elements of national environmental governance models could be utilised in the further improvement of the environmental monitoring and control system in Ukraine. Therefore, it is advisable to identify the institutional and legal mechanisms that may be of practical interest for adaptation to the Ukrainian environmental governance system (Table 3). An analysis of environmental monitoring and control mechanisms in the EU and Ukraine shows that the differences between these models lie not only in the structure of

[1] Law of Ukraine No. 377-IX "On the Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions". (2019, December). Retrieved from https://zakon.rada.gov.ua/laws/show/377-20#Text.

regulatory frameworks or the organisation of control procedures, but also in the functional significance of environmental monitoring within the system of environmental governance. In the European Union, mechanisms for monitoring, environmental reporting, digital data exchange and the enforcement of environmental obligations are integrated into a single regulatory governance system geared towards achieving climate and environmental objectives. In this model, environmental information is used as a tool for assessing environmental risks, preparing regulatory decisions, verifying compliance with climate commitments and ensuring adherence to the EU's environmental acquis.

Table 3. Elements of the experience of EU Member States that could be used to improve the environmental monitoring and control system in Ukraine

Country	Identified characteristics of environmental governance	Potential for use in Ukraine
Germany	Exercise of supervisory powers at the level of the federal states and the integration of regional monitoring systems into the national environmental management system	Extension of the powers of regional authorities in environmental monitoring and the development of coordination mechanisms between central and local authorities
France	Integration of environmental monitoring with climate planning procedures and the implementation of national environmental programmes	Strengthening connections between environmental monitoring system, climate policy and strategic planning documents
Netherlands	Use of integrated digital platforms for the collection, processing and exchange of environmental data between public authorities	Further development of the EcoSystem Environmental Platform (n.d.) and the integration of environmental registers into a single digital environment
Poland	Aligning national environmental control mechanisms with the requirements of EU environmental legislation and the gradual modernisation of monitoring systems	Use of experience in adapting environmental legislation and the activities of environmental regulatory bodies t o the requirements of EU law

Source: compiled by the authors

Ukrainian environmental monitoring and control system is undergoing regulatory and institutional transformation as part of its adaptation to EU environmental legislation. The implementation of environmental impact assessment procedures, strategic environmental assessment, mechanisms for monitoring, reporting and verifying greenhouse gas emissions, as well as the development of digital environmental platforms, indicate an expansion of the functions of environmental monitoring within the public administration system. At the same time, the analysis shows that mechanisms for environmental control, digital monitoring, environmental reporting and public planning continue to operate within the framework of separate administrative procedures. This is reflected in the fragmented distribution of regulatory powers, insufficient integration of environmental data across information systems, limited use of monitoring results in strategic planning procedures, and the absence of a single coordination mechanism for environmental governance.

The study found that the alignment of Ukrainian legislation with the EU's environmental acquis is primarily characterised by the implementation of specific procedural mechanisms, whilst the functional integration of environmental monitoring into the regulatory management system remains incomplete. This is evident in the separate operation of the systems for state environmental monitoring, licensing, environmental impact assessment, strategic environmental assessment and climate reporting. Unlike the EU model, under which the results of environmental monitoring are used to assess compliance with climate commitments, verify the effectiveness of environmental policy and inform regulatory decisions, in Ukraine environmental information is predominantly used within the framework of monitoring, reporting and permitting procedures conducted by individual government bodies.

The results of the cross-country comparison indicate that improving the environmental monitoring and control system in Ukraine does not require the direct adoption of a specific national model of environmental governance. The experience of the countries studied demonstrates various approaches to organising environmental control, the digitalisation of monitoring procedures and the integration of environmental data into public administration processes. In this regard, it is advisable to adopt specific institutional and organisational solutions that meet the needs of the national environmental governance system. For Ukraine, experience of Germany regarding the coordination of regional environmental monitoring bodies is relevant, as is that of France regarding the interconnection of environmental monitoring with climate planning, that of the Netherlands regarding the integration of digital environmental data into unified information systems, and Poland's experience in adapting national institutions to the requirements of European Union environmental legislation. Application of these approaches could be addressed during the further improvement of the regulatory and organisational framework for the functioning of the environmental monitoring system in Ukraine.

Discussion

The study has shown that, within the framework of the European Green Deal, a comprehensive model of environmental governance has emerged in the EU, in which mechanisms for monitoring, reporting, verification and enforcement are integrated into the system for achieving the European Union's climate and environmental objectives. The study established that, in the current model of EU law, environmental monitoring serves not only an informational function but is also used as a tool for ongoing regulatory oversight of Member States' compliance with their climate commitments. The findings indicate a strengthening of the supranational nature of environmental control through the combination of climate reporting mechanisms, the digital exchange of environmental data, and procedures for assessing the alignment of national policies with decarbonisation targets. Furthermore, the study established that the EU's environmental governance system operates based on multi-level coordination between EU institutions and national authorities, ensuring the integration of environmental control into industrial, energy, transport and climate policies.

The results obtained are generally consistent with the findings of E. Derkenbaeva *et al.* (2026), who established that the implementation of EU environmental policy depends on a multi-level model of coordination between supranational and local institutions. The researchers demonstrated that, within the framework of the Positive Energy Areas initiative, mechanisms of Europeanisation are combined with local characteristics of administrative decision-making, resulting in heterogeneity in the practical implementation of environmental policy across different Member States. In contrast to this approach, the present study focused not on local differences in environmental governance, but on the transformation of regulatory and institutional mechanisms for environmental monitoring within the framework of the European Green Deal. At the same time, the findings of both studies concur in the conclusion that the role of coordination mechanisms and the digital exchange of environmental information is growing within the EU's environmental policy implementation system. The study found that the existing model of EU environmental governance is characterised by the integration of environmental control into the system of economic and industrial regulation, as a result of which environmental legislation is beginning to fulfil the function of structural regulation of decarbonisation processes. The study determined that the MRV mechanisms, the Environmental Implementation Review system and the INSPIRE digital infrastructure form a unified system of supranational oversight of the implementation of climate targets. These findings are consistent with those of G. Dominioni *et al.* (2025), who concluded that the European Green Deal is gradually becoming a global regulatory model capable of influencing not only EU Member States but also the Union's external partners. The researchers found that dissemination of EU climate standards through trade, financial and investment mechanisms contribute to the extraterritorial expansion of the European Union's environmental regulation. In contrast to this approach, the present study focused primarily on internal mechanisms for environmental monitoring and control within the EU; however, both studies confirm the growing supranational nature of the European Union's environmental policy. The analysis also showed that the implementation of the European Green Deal is accompanied by a transformation in the functions of environmental control, which is shifting from responding to individual breaches of environmental legislation to a model of continuous regulatory oversight. The study established that the results of environmental monitoring are used in procedures to assess the effectiveness of public policy, verify compliance with climate commitments and apply mechanisms of legal liability. S. Filipović *et al.* (2022) substantiated the interconnection between the European Green Deal, the concept of a just transition and the Sustainable Development Goals. The study found that achieving climate neutrality in the EU is impossible without integrating environmental regulation with social and economic mechanisms to support transformational processes. Furthermore, the researchers emphasised that the implementation of EU climate policy requires the establishment of systems for the ongoing assessment of the effectiveness of environmental reforms and the monitoring of their socio-economic impact. These conclusions are consistent with the findings of a study which established that environmental monitoring in the EU is used not only to assess the state of the environment, but also to ensure the achievement of strategic climate transition objectives.

This study analysed the integration of digital mechanisms for managing environmental information into the EU's environmental governance system. The study established that the operation of the European Environment Information and Observation Network, INSPIRE and automated industrial emissions monitoring systems ensures the standardisation of environmental indicators and the interoperability of Member States' national information systems. As a result, environmental data is integrated into procedures for planning, monitoring, assessing environmental risks and verifying compliance with environmental obligations. Similar conclusions were reached by B. Li *et al.* (2025), who found that achieving climate neutrality in European industrial economies depends directly on a combination of environmental governance mechanisms, "green" financing and emission-reduction technologies. The researchers demonstrated that the digitalisation of environmental

monitoring and the use of environmental data in management decision-making contribute to improving the effectiveness of climate policy and environmental control. At the same time, this study focused primarily on the legal and institutional mechanisms underpinning the functioning of the environmental monitoring system, rather than on the economic instruments of environmental transformation.

The study has shown that the implementation of European environmental standards within Ukraine's environmental monitoring and control system is characterised by a gradual transition from a fragmented approach to environmental regulation towards an integrated model of environmental governance, aligned with the requirements of the EU acquis. It has been established that the adaptation of Ukrainian legislation is accompanied by the expansion of environmental reporting mechanisms, the digitalisation of monitoring procedures, the harmonisation of environmental assessment standards, and the integration of climate targets into the system of public administration. At the same time, the study's findings indicate that the implementation of European environmental standards remains uneven due to the fragmentation of institutional powers, insufficient coordination between public authorities and a limited level of digital integration of environmental information systems. It has also been established that the Ukrainian environmental control system remains predominantly reactive in nature, whereas the EU model is geared towards continuous regulatory oversight and preventive management of environmental risks. I. Dir (2025) found that the harmonisation of Ukrainian legislation with EU law, within the framework of implementing the environmental acquis, is characterised by uneven adaptation across individual sectors of legal regulation. The study demonstrated that areas relating to the institutional framework for enforcing environmental legislation and the establishment of an effective system of administrative control remain challenging for Ukraine. The author also emphasised that the formal alignment of regulatory acts with EU standards does not automatically ensure effective environmental governance without a transformation of the institutional mechanisms for their implementation. This study found that the problem with implementing European environmental standards in Ukraine lies not only in the adaptation of legislation, but also in the insufficient integration of monitoring, reporting and control mechanisms into the system of public administration.

The study also found that environmental monitoring in Ukraine is gradually being integrated into the mechanisms for implementing climate and energy policy in line with the objectives of the European Green Deal. The study determined that the development of environmental reporting systems, the introduction of procedures for assessing industrial emissions and the expansion of climate regulation mechanisms are accompanied using financial instruments to incentivise environmental transformation. These findings correlate with the conclusions of I. Nazarkevych & O. Sych (2023), who concluded that environmental taxation in Ukraine is gradually beginning to function as a tool for implementing the European Green Deal. The researchers found that harmonising tax policy with the EU's climate objectives facilitates the integration of environmental criteria into economic regulation mechanisms and stimulates the development of "green" transformation. At the same time, aforementioned authors focused primarily on the financial and economic mechanisms of environmental policy, whereas the present study emphasised the legal and institutional mechanisms governing the functioning of the environmental monitoring and control system.

Study results indicate that the adaptation of the Ukrainian environmental control system to EU standards is accompanied by a gradual expansion of environmental impact assessment procedures, stricter requirements for environmental reporting, and the development of mechanisms for the digital exchange of environmental information. At the same time, the study established that, in practice, the effectiveness of these mechanisms is limited by a lack of coordination between central and regional environmental management bodies, as well as by the fragmented nature of information systems. O. Uliutina & A. Starokin (2024) found that the legal framework for environmental protection in Ukraine remains less systematic compared to the EU model. The researchers demonstrated that in European countries, environmental legislation operates in conjunction with mechanisms for state control, digital monitoring and a system for ensuring compliance with environmental requirements. The authors also emphasised that Ukraine continues to face problems of insufficient institutional coordination and the incomplete integration of environmental monitoring into the management decision-making system. These conclusions are consistent with the findings of the study, which established that the implementation of EU environmental standards in Ukraine has not been accompanied by the full development of an integrated system of environmental governance. The study also found that the process of harmonising the Ukrainian environmental monitoring system with EU requirements is characterised by a gradual transition towards the use of digital mechanisms for collecting and processing environmental information. The study established that the introduction of European standards for environmental reporting and data verification procedures creates the conditions for ensuring the compatibility of

Ukrainian environmental information systems with European digital platforms. At the same time, the study's findings showed that the level of digitalisation of environmental monitoring in Ukraine lags significantly behind EU practices, particularly in the areas of automated monitoring of industrial emissions and the integrated exchange of environmental data between government bodies.

Consequently, implementation of European environmental standards in Ukraine is accompanied by a gradual transformation of the environmental monitoring and control system in line with the principles of the European Green Deal. At the same time, it has been established that the effectiveness of this process is hampered by insufficient institutional coordination, the fragmented nature of the digital infrastructure, and the incomplete integration of monitoring, reporting and control procedures into the environmental governance system. In contrast to most of the analysed studies, which primarily address individual aspects of the harmonisation of environmental legislation or the financial mechanisms of the "green" transition, this study characterised the interrelationship between legal, institutional and digital mechanisms for the implementation of European environmental standards within Ukraine's environmental monitoring and control system.

■ Conclusions

The study has shown that the implementation of the European Union's environmental policy within the framework of the European Green Deal is accompanied by the development of an integrated system of environmental governance, in which climate, industrial, energy and digital mechanisms operate within a single regulatory framework. In contrast to the sectoral approach to environmental protection, which has long prevailed in environmental regulation, the current EU model envisages the interconnected use of mechanisms for environmental monitoring, climate planning, environmental risk assessment, digital data management and the monitoring of compliance with environmental obligations. An analysis of EU legislation identified the main structural elements of this model: climate regulation, industrial environmental control, the digitalisation of environmental governance, multi-level institutional coordination, and mechanisms to ensure compliance with environmental legislation. The study established that environmental monitoring in the EU is integrated into the procedures for assessing Member States' fulfilment of climate commitments, and that environmental reporting is used not only to gather environmental information but also as a component of the system of regulatory control and management decision-making.

Analysis of institutional mechanisms has shown that the coordination of EU environmental policy is based on cooperation between the European Commission, the Directorate-General for the Environment, the European Environment Agency, the European Environment Information and Observation Network, and the national authorities of the Member States. A comparison of practices in Germany, France, the Netherlands and Poland revealed differences in the organisation of environmental control, the use of digital monitoring tools and the integration of environmental data into public administration processes. The study established that in Ukraine, the implementation of European environmental standards is accompanied by the development of environmental impact assessment procedures, strategic environmental assessment and a system for monitoring, reporting and verifying greenhouse gas emissions. At the same time, environmental monitoring, state control, environmental reporting and permitting procedures continue to operate within separate administrative mechanisms. A comparative analysis has revealed differences between the EU and Ukrainian models in the areas of institutional coordination, the digitalisation of environmental monitoring, the use of environmental data and mechanisms for ensuring compliance with environmental legislation. The limitations of the study are related to the analysis of predominantly regulatory and institutional aspects of environmental governance, without an assessment of the actual effectiveness of environmental policy implementation at the level of individual states. Further research should analyse practical outcomes of the operation of greenhouse gas emissions MRV systems in Ukraine and EU Member States.

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■ Conflict of Interest

None.

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Інституційно-правові механізми екологічного моніторингу та контролю в межах Європейського зеленого курсу: порівняльний аналіз політики ЄС та України

Євгеній Суєтнов
Кандидат юридичних наук, доцент
Національний юридичний університет імені Ярослава Мудрого
61024, вул. Григорія Сковороди, 77, м. Харків, Україна
https://orcid.org/0000-0002-4094-444X

Вікторія Бредіхіна
Кандидат юридичних наук, доцент
Національний юридичний університет імені Ярослава Мудрого
61024, вул. Григорія Сковороди, 77, м. Харків, Україна
https://orcid.org/0000-0002-7983-1098

Олена Лозо
Кандидат юридичних наук, доцент
Національний юридичний університет імені Ярослава Мудрого
61024, вул. Григорія Сковороди, 77, м. Харків, Україна
https://orcid.org/0000-0002-2789-533X

Ельбіс Туліна
Кандидат юридичних наук, доцент
Національний юридичний університет імені Ярослава Мудрого
61024, вул. Григорія Сковороди, 77, м. Харків, Україна
https://orcid.org/0000-0002-8780-5682

Олена Малохліб
Кандидат юридичних наук
Національний юридичний університет імені Ярослава Мудрого
61024, вул. Григорія Сковороди, 77, м. Харків, Україна
https://orcid.org/0000-0003-3081-8076

■ **Анотація.** Метою дослідження був порівняльний аналіз механізмів екологічного моніторингу та контролю Європейського Союзу й України з огляду на сучасні вимоги Європейського зеленого курсу. У дослідженні застосовано формально-юридичний, інституційний та порівняльно-правовий методи, використання яких дало змогу проаналізувати нормативно-правові засади екологічного моніторингу та контролю, особливості інституційної координації екологічного врядування, а також порівняти моделі екологічного регулювання Європейського Союзу й України. Доведено, що в межах Європейського зеленого курсу сформувалася інтегрована модель екологічного врядування, яка поєднує механізми кліматичного регулювання, промислового екологічного контролю, цифровізації екологічної інформації, багаторівневої інституційної координації та забезпечення виконання екологічного законодавства. Виокремлено п'ять структурних елементів цієї моделі та встановлено, що системи моніторингу, звітності й верифікації викидів парникових газів, а також Європейська мережа екологічної інформації та спостереження забезпечують інтеграцію екологічних даних у процедури кліматичного планування, оцінки екологічних ризиків і наднаціонального контролю за виконанням кліматичних зобов'язань. Визначено, що екологічний моніторинг у Європейському Союзі трансформувався з механізму фіксації порушень природоохоронного законодавства в систему постійного регуляторного нагляду й оцінювання ефективності екологічної політики. У процесі дослідження також встановлено, що імплементація європейських екологічних стандартів в Україні супроводжується розширенням функцій екологічного моніторингу через інтеграцію процедур оцінювання впливу на довкілля, стратегічного екологічного оцінювання та системи моніторингу, звітності й верифікації викидів парникових газів. Виявлено, що в Україні екологічний моніторинг

переважно використовують у межах контрольних, звітних і дозвільних процедур, натомість у Європейському Союзі результати моніторингу інтегруються в механізми стратегічного планування, оцінювання екологічних ризиків і перевірки виконання кліматичних зобов'язань. Практичне значення отриманих результатів полягає в можливості використання виявлених структурних і функціональних відмінностей між моделями Європейського Союзу й України для подальшої гармонізації української системи екологічного моніторингу та контролю з правовим доробком Європейського Союзу у сфері охорони навколишнього природного середовища

■ **Ключові слова:** екологічне право; кліматичне право; екологічна політика; кліматичне планування; оцінка екологічних ризиків; виконання кліматичних зобов'язань; гармонізація законодавства

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Psychological resilience as an adaptive mechanism for supporting mental health

Yuliia Boiko-Buzyl*
Doctor of Psychology, Professor
National Academy of Internal Affairs
03035, 1 Solomianska Sq., Kyiv, Ukraine
https://orcid.org/0000-0002-1715-4327

■ **Abstract.** The relevance of the topic was determined by the need for scientifically grounded approaches to strengthening the mental well-being of individuals, who functioned for a long time in a stressful environment and were exposed to war-related events, forced displacement, losses, professional workload, and uncertainty about the future. The purpose of the article was to theoretically substantiate and empirically clarify the role of resilience in maintaining mental health, as well as to identify its structural components and socio-psychological determinants. The study was based on the results of a psychodiagnostic assessment of 214 respondents, including representatives of the security and defense sector, educators, medical workers, psychologists, volunteers, internally displaced persons, and civilians affected by war-related events. The CD-RISC-10 and BRS scales, descriptive statistics, comparative subgroup analysis, and Pearson correlation analysis were used. Descriptive results indicated a predominantly moderate level of resilience and recovery capacity: CD-RISC-10 M = 27.8 (SD = 6.3; Me = 28.0), and BRS M = 3.51 (SD = 0.70; Me = 3.50). Statistically significant associations were found between resilience and emotional stability ($r = 0.61$; $p < 0.01$), lower anxiety ($r = -0.54$; $p < 0.01$), and subjective well-being ($r = 0.58$; $p < 0.01$). The findings showed that individuals with higher resilience scores more often exhibited active coping strategies, cognitive reappraisal of stressful events, readiness to seek social support, and the ability to maintain functionality under difficult conditions. In groups affected by war or forced displacement, resilience performed a buffering function by mitigating the psychological consequences of traumatic events and reducing the risk of emotional maladjustment. It was specified that resilience depended on the interaction of cognitive-regulatory, emotional-motivational, and social-communicative components, as well as on the availability of a supportive social and organisational environment. The results indicated the expediency of developing resilience through a combination of individual self-regulation skills training with group and organisational forms of psychological support. The obtained data may be used to develop psychoprophylactic programmes, resource-oriented training, and systems for the dynamic monitoring of mental health risks in various socio-professional groups

■ **Keywords:** stress; self-regulation; coping strategies; social support; war trauma; adaptive potential

■ Introduction

The relevance of studying psychological resilience was determined by the prolonged impact of military, social and occupational stressors on the mental health of the population of Ukraine. Under conditions of armed aggression, forced displacement, losses, information-related tension and occupational exhaustion, mental health emerged not only as an individual value but also as a resource for social viability, recovery and the security capacity of the state. According to the approach of World Health Organization (2025), mental health encompasses a person's ability to cope with stress, realise their own

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■ *Corresponding author (*b-byy@ukr.net*)

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potential, learn, work and contribute to community life. Particular attention was required by groups that systematically functioned in stressogenic environments, including security and defence personnel, healthcare workers, educators, volunteers, internally displaced persons and civilians who were directly or indirectly affected by the war.

In this context, psychological resilience was considered as an individual's ability to preserve functionality, mobilise internal and external resources, respond adaptively to stress and restore psychological balance after crisis events. In contrast to situational endurance, resilience had a processual nature, since it was formed through the interaction of cognitive flexibility, emotional self-regulation, self-efficacy, life-meaning orientations and social support. Its content was not limited to the ability to resist the negative influence of stressors, but also included the capacity to reinterpret difficult experience, maintain a sense of control over one's life situation, sustain social connections and find constructive ways of overcoming difficulties. In this sense, resilience acted not only as a protective resource but also as a mechanism of psychological recovery, which ensured the transition from disorganisation to stabilisation and from exhaustion to the gradual restoration of personal and professional functioning. It acquired particular significance under wartime conditions, when a person remained for a prolonged period under the influence of uncertainty, threats, losses and high emotional tension. Therefore, the study of psychological resilience became important for the development of programmes for psychoprevention, psychological support, crisis intervention and organisational strengthening of the resilience of various socio-professional groups.

Contemporary studies of resilience increasingly moved away from interpreting it as a stable individual trait and considered it as a process of adaptation that unfolded over time and depended on the balance between risks, resources and context. N. Hiebel *et al.* (2021), in a narrative review of process-oriented approaches, showed that the key problem in contemporary research was not the recognition of resilience itself, but its operationalisation. It was necessary to clearly define the positive outcome of adaptation, the temporal dynamics of recovery and the mechanisms that mediated the influence of stress on mental functioning. The psychobiological dimension of this issue was revealed in the work of D.S. Charney (2004), in which the role of neurobiological mechanisms of adaptation and vulnerability to extreme stress was substantiated. This became fundamental, as it made it possible to analyse resilience not only as a high score on a psychodiagnostic scale, but as the interaction of self-regulation, coping, social support and the organisational environment. M. Ungar & P. Jefferies (2021), developing the resource-environmental approach, demonstrated that resilience was formed through the combination of individual "robustness" and the availability of external resources. This provision is important for analysing individuals who live or work under wartime conditions, since even strong personal resources may be insufficient without support from the family, professional group, community and organisation. O. Kredentser & D. Serhienko (2024) considered resilience as an important factor in the subjective well-being of psychologists under wartime conditions. The authors placed the main emphasis on the fact that the capacity for psychological recovery, adaptation and preservation of professional effectiveness helped specialists maintain emotional stability despite the prolonged influence of stressogenic factors. The study by M. Sihova & O. Morozova (2020) was devoted to the relationship between the level of resilience and the professional success of HR specialists. The researchers emphasised that higher resilience contributed to better adaptation to professional challenges, more effective coping with stress and the preservation of productivity under conditions of intensive interpersonal interaction.

The practice-oriented direction of contemporary research was focused on how resilience could be developed through specialised support programmes. W.H.D. Ang *et al.* (2022) demonstrated that digital resilience training could increase resilience while simultaneously reducing symptoms of anxiety, depression and stress; however, its effectiveness depended on the structure of the programme, flexibility of access and the quality of methodological content. A.F. Moreno *et al.* (2024), analysing resilience development programmes in the police, showed the importance of psychoeducation, scenario-based training, debriefing, self-regulation and organisational support. M. Christopher *et al.* (2024) analysed the feasibility of applying mindfulness-based resilience training for law-enforcement officers who had experienced significant occupational stress. The authors confirmed the acceptability and practical feasibility of such a programme and also outlined its potential for further examination of its impact on stress, mental health, aggressiveness and professional resilience among law-enforcement officers. J. Gaskin *et al.* (2025) summarised the results of 11 studies involving 967 police officers concerning the impact of mindfulness interventions on stress and mental health and concluded that such interventions had a small to moderate positive effect after programme completion. The aim of the article was to provide a theoretical substantiation and empirical clarification of the role of psychological resilience as an adaptive mechanism for supporting an individual's mental health under conditions of prolonged stress, as well

as to determine its structural components, socio-psychological determinants and directions for the practical application of the obtained results.

■ Materials and Methods

The study used a set of general scientific, psychological and statistical methods that ensured a systematic examination of the phenomenon of psychological resilience. The methodological basis consisted of systemic, activity-based and contextual approaches, which made it possible to consider resilience not as an isolated personality trait, but as a multidimensional dynamic construct formed through the interaction of personal and environmental resources. Within the framework of the theoretical analysis, psychodynamic, cognitive-behavioural, neuropsychological, socio-ecological, resource-based and organisational approaches to understanding resilience were systematised. The theoretical-analytical method was used for the critical examination of scientific sources devoted to resilience, mental health, coping strategies and psychological recovery after stress. The systemic-structural method made it possible to consider psychological resilience as an integral adaptive mechanism that encompassed cognitive-regulatory, emotional-motivational and social-communicative components. The cognitive-regulatory component was associated with the rational interpretation of events, cognitive reappraisal, attentional control and the ability to make decisions under conditions of uncertainty. The emotional-motivational component characterised the stability of the emotional state, tolerance of frustration, internal motivation to overcome difficulties and the preservation of meaning-related orientations. The social-communicative component reflected the ability to seek and accept support, maintain trust, interact with a professional group and use the resources of the social environment. The empirical basis of the study consisted of the results of a psychodiagnostic assessment of psychological resilience and related indicators of mental functioning. The total number of respondents was 214, including 119 women (55.6%) and 95 men (44.4%). The age range of the participants was from 20 to 59 years (M = 36.8; SD = 9.4). The sample included individuals who had experience of prolonged residence or professional activity under conditions of military, social or occupational stress. For comparison, five socio-professional subgroups were identified, the structure of which is presented in Table 1.

Table 1. Structure of the respondent sample

No.	Socio-professional subgroup	n	%
1	Personnel of the security and defence sector	76	35.5
2	Educators, healthcare workers and psychologists	48	22.4
3	Volunteers	26	12.1
4	Internally displaced persons	36	16.8
5	Civilians affected by war-related events	28	13.2
	Total	214	100.0

Source: compiled by the author

The study had a cross-sectional correlational design and was conducted on a purposive, non-randomised sample. This design made it possible to identify statistical relationships between resilience indicators and indicators of mental functioning; however, it did not provide grounds for establishing cause-and-effect relationships. The obtained results were interpreted as an empirical clarification of associations between the studied variables within specific socio-professional subgroups, rather than as evidence of a direct causal effect of resilience on emotional stability, anxiety level or subjective well-being. For psychodiagnostic measurement, the Connor-Davidson Resilience Scale-10 (CD-RISC-10), developed by K.M. Connor & J.R.T. Davidson (2003), was used in the validated Ukrainian version by N. Shkolina *et al.* (2020). The method contains 10 statements that reflected the ability to adapt to change, overcome difficulties, remain focused under pressure, recover after failures, mobilise internal resources and act despite stress. Each statement was assessed according to five response categories from 0 to 4 points. The total score could range from 0 to 40 points, where a higher score indicated more pronounced psychological resilience, adaptability, self-regulation and the ability to mobilise personal resources in stressful situations. For interpretation in this study, the following working levels of CD-RISC-10 were used: low – 0-19 points, moderate – 20-29 points and high – 30-40 points. In addition, the Brief Resilience Scale (BRS), proposed by B.W. Smith *et al.* (2008), was applied. This scale assessed not general resilience as a resource, but the individual's ability to recover after exposure to stress. The scale contains 6 items, the content of which covered the speed of returning to normal functioning after difficult events, the ability to go through difficult periods, and difficulties in recovery after stress. Items 1, 3 and 5 had a direct orientation, whereas items 2, 4 and 6 were reverse-oriented; therefore, they were reverse-coded before the overall score was calculated. The total score was determined as the arithmetic mean of the

responses; lower values indicated a weaker ability to recover (1.00-2.99 points), medium values indicated a moderate ability (3.00-4.30 points), and higher values indicated a more pronounced ability to restore psychological balance rapidly after stress (4.31-5.00 points). The BRS was used to clarify the processual aspect of resilience and compare it with the integral CD-RISC-10 indicator.

The measurement procedure involved an anonymous survey, preceded by informing respondents about the aim of the study, the voluntary nature of participation, the confidentiality of responses and the possibility of discontinuing participation without providing reasons. Respondents were given identical instructions for completing the scales. Only complete responses were considered during data processing. The inclusion criteria were adulthood, voluntary consent to participate, the ability to complete the questionnaires independently and the presence of experience of living or working under conditions of prolonged stress. The exclusion criteria included incomplete completion of the forms, formal or random responses, as well as a condition that could significantly hinder conscious participation in the survey. Statistical processing was performed using descriptive statistics, subgroup analysis and Pearson correlation analysis. The correlation indicators $r = 0.61$, $r = -0.54$ and $r = 0.58$ were interpreted as coefficients of association between the integral level of resilience and the corresponding indicators of mental functioning; relationships at $p < 0.01$ were considered statistically significant. Socio-professional affiliation, experience of exposure to war-related events or forced displacement, as well as indicators of emotional stability, anxiety and subjective well-being, were recorded separately and used for correlational comparison with integral resilience indicators.

Results and Discussion

Psychological resilience acted as an important resource for supporting mental health under conditions of prolonged exposure to stressogenic factors. In the overall study sample, a predominantly moderate level of psychological resilience was identified, which indicated that the respondents had a basic ability to adapt to difficult circumstances, mobilise internal resources and maintain functionality in situations of increased psychological strain. At the same time, the indicators of the ability to recover after stress exposure showed that not all respondents were equally able to return rapidly to a stable emotional state after experienced difficulties. The comparison of socio-professional subgroups showed that manifestations of resilience depended on the combination of personal, professional and environmental resources. Among representatives of professions associated with a high level of responsibility and constant contact with stressful situations, psychological resilience was more closely related to self-regulation, experience in overcoming crisis circumstances and the ability to maintain working capacity under pressure. In the groups that had been affected by war-related events or forced displacement, resilience was primarily manifested through the ability to restore emotional balance, rely on social support and gradually adapt to new living conditions. The comparison of CD-RISC-10 and BRS indicators with indicators of emotional stability, anxiety and subjective well-being confirmed that a higher level of resilience was accompanied by better emotional self-regulation, lower severity of anxiety manifestations and a higher level of subjective well-being. This provided grounds for considering resilience not only as a general characteristic of psychological stability, but also as a dynamic mechanism of recovery after stress. Thus, the combination of CD-RISC-10 and BRS results made it possible to establish that mental health was supported both by the individual's ability to withstand stress exposure and by their capacity to restore psychological balance after experienced difficulties (Table 2).

Table 2. Descriptive statistics for the main resilience scales

Scale	M	SD	Me	Min.	Max.	Interpretative focus
CD-RISC-10	27.8	6.3	28.0	10	40	Resilience, adaptability, mobilisation of resources
BRS	3.51	0.70	3.50	1.67	5.00	Recovery after stress

Note: M – arithmetic mean; SD – standard deviation; Me – median; Min. – minimum value; Max. – maximum value

Source: compiled by the author

A moderate level of resilience prevailed in the overall sample. The mean CD-RISC-10 score ($M = 27.8$) fell within the moderate range; however, the median value ($Me = 28.0$), the minimum score (10 points) and the maximum score (40 points) indicated noticeable internal variability within the sample: alongside respondents with sufficiently developed adaptive resources, there was also a group of individuals with lower resilience scores. According to the BRS, the mean value ($M = 3.51$) also corresponded to a moderate ability to recover after stress. To specify these results, respondents were distributed by levels of resilience and recovery ability, as presented in Table 3.

Table 3. Distribution of respondents by levels of resilience and recovery ability

Indicator	Level	Criterion	n	%
CD-RISC-10	Low	0-19 points	24	11.2
CD-RISC-10	Moderate	20-29 points	119	55.6
CD-RISC-10	High	30-40 points	71	33.2
BRS	Low recovery ability	1.00-2.99 points	43	20.1
BRS	Moderate recovery ability	3.00-4.30 points	132	61.7
BRS	High recovery ability	4.31-5.00 points	39	18.2

Source: compiled by the author

The distribution by levels showed that most respondents were not within the range of markedly low resilience; however, the proportion of individuals with low scores was sufficient to justify psychopreventive work. Particular attention was required by respondents with a low CD-RISC-10 level (11.2%) and low recovery ability according to the BRS (20.1%), since these groups could have had greater vulnerability to emotional exhaustion, anxiety reactions and maladaptive coping strategies. At the same time, the overall distribution did not explain which socio-professional groups accounted for the differences in resilience and recovery. Therefore, the next step was to compare the descriptive CD-RISC-10 and BRS indicators across the sample subgroups.

Table 4. Descriptive indicators of resilience by socio-professional subgroup

Socio-professional subgroup	CD-RISC-10 M	CD-RISC-10 SD	CD-RISC-10 min.-max.	BRS M	BRS SD	BRS min.-max.
Security and defence sector	28.7	5.8	14-40	3.58	0.66	2.00-4.83
Educators, healthcare workers and psychologists	29.1	5.4	15-40	3.66	0.61	2.33-5.00
Volunteers	30.0	4.9	18-40	3.72	0.58	2.50-5.00
Internally displaced persons	23.9	6.6	10-37	3.16	0.74	1.67-4.50
Civilians affected by the war	25.8	6.2	12-38	3.29	0.70	2.00-4.67

Source: compiled by the author

The presented data demonstrated that the highest mean CD-RISC-10 psychological resilience scores were recorded among volunteers (M = 30.0), educators, healthcare workers and psychologists (M = 29.1), as well as personnel of the security and defence sector (M = 28.7). In these groups, resilience was supported by a combination of professional experience, social inclusion, self-regulation skills and a sense of significance attached to the activity performed. Lower mean scores were identified among internally displaced persons (M = 23.9) and civilians affected by war-related events (M = 25.8), which could have been associated with greater uncertainty of the life situation, loss of a stable environment, experience of displacement or direct exposure to threats. A similar tendency was observed for the BRS: the highest recovery ability was characteristic of volunteers, educators, healthcare workers and psychologists, whereas among internally displaced persons and affected civilians it was lower, although it did not reach the range of critically low values. These intergroup comparisons had a descriptive-analytical character and were not interpreted as statistically proven differences between subgroups without the application of additional criteria for intergroup comparison (Smith *et al.*, 2008; Shkolina *et al.*, 2020). The obtained results also indicated statistically significant relationships between the level of resilience and key indicators of respondents' mental functioning. Higher resilience scores were combined with greater emotional stability, a lower level of anxiety and higher subjective well-being. This indicated that psychological resilience was not an isolated characteristic, but was related to the general level of an individual's emotional adaptation. The data presented in Table 5 confirmed that resilience performed a protective function, since it contributed to the preservation of emotional balance and the reduction of negative mental manifestations under conditions of prolonged stress load.

Table 5. Statistically significant relationships between resilience and indicators of mental functioning

Indicator of mental functioning	Relationship with resilience	Interpretation of the obtained result
Emotional stability	$r = 0.61$; $p < 0.01$	The coefficient $r = 0.61$ indicated a positive relationship of moderate-to-strong strength: as resilience increased, the ability to maintain emotional balance under stress also increased.
Anxiety level	$r = -0.54$; $p < 0.01$	The coefficient $r = -0.54$ indicated a negative relationship of moderate strength: higher resilience scores were associated with lower severity of anxiety reactions.

Table 5. Continued

Indicator of mental functioning	Relationship with resilience	Interpretation of the obtained result
Subjective well-being	$r = 0.58$; $p < 0.01$	The coefficient $r = 0.58$ reflected a positive relationship of moderate-to-strong strength: resilience was associated with higher self-assessment of psychological state, life capacity and well-being.

Source: compiled by the author

Thus, resilience was most clearly associated with the regulation of emotional tension and the ability to preserve a subjective sense of control over the situation. The positive relationship with emotional stability meant that respondents with higher resilience scores on the scales used more often maintained behavioural control, the ability to self-soothe and readiness to act under conditions of uncertainty. The negative relationship with anxiety indicated the buffering effect of resilience: it did not eliminate the stressor itself, but was associated with a reduction in the intensity of the anxiety response and the risk of emotional disorganisation. The positive relationship with subjective well-being confirmed that resilience supported not only situational endurance, but also a broader sense of life capacity. Given the correlational design, these results should be interpreted as statistical associations rather than as evidence of a direct causal effect of resilience on indicators of mental functioning.

The analysis of socio-professional subgroups showed that the same integral resilience score could have different substantive content depending on professional experience, social status, the nature of experienced stressogenic events and the availability of support resources. Among personnel of the security and defence sector, the level of resilience was more strongly associated with organisational factors, including managerial support, unit cohesion, clarity of service instructions, experience of professional training and the ability to act under conditions of increased risk and stress. Among representatives of the group of educators, healthcare workers and psychologists, skills of emotional self-regulation, reflection, professional interpretation of crisis situations and maintenance of constructive interaction with people experiencing difficult life circumstances were more pronounced. Among volunteers, significant factors of resilience included value-based motivation, social involvement, a sense of usefulness of one's own activity and belonging to a community of mutual assistance. Internally displaced persons more often required stable social support, predictability, restoration of a sense of safety and gradual adaptation to a new environment. Among civilian respondents affected by war-related events, emotional recovery, reinterpretation of the experienced events and preservation of everyday functionality acquired particular importance.

In the groups affected by hostilities, forced displacement or prolonged occupational strain, the buffering effect of resilience was identified. It was manifested in reduced intensity of anxiety reactions, a lower tendency towards rumination, greater readiness to structure everyday activity and use support from others. Among some respondents with high resilience scores, a tendency towards post-traumatic growth was observed, including reconsideration of life priorities, increased empathy, strengthened social activity and readiness to participate in helping practices, which corresponded to the provisions of R.G. Tedeschi & L.G. Calhoun (2004). The practical block of the results indicated that the development of resilience had to be carried out not only through individual interventions, but also through organisational and group support mechanisms. The most substantiated programmes were those that combined cognitive-behavioural techniques, mindfulness practices, self-regulation training, development of stress-management skills, group support and the creation of a psychologically safe professional environment. The cognitive-behavioural component of such programmes could be based on the approaches of D.A. Clark & A.T. Beck (2009), which were focused on working with anxiety reactions and maladaptive cognitive schemas. For personnel of the security and defence sector, regular psychological screening, supervisory support, preparation of managers for the early recognition of signs of exhaustion and the formation of a team culture of mutual assistance were particularly important. This conclusion was consistent with the data of R.N. Carleton *et al.* (2025) on changes in symptoms of mental disorders after resilience programmes for public safety personnel, as well as with the systematic review by C. Randall *et al.* (2025), which emphasised the importance of preventive programmes after exposure to occupationally determined traumatisation. The data of R.-W. Liao *et al.* (2025) on individual resilience-building interventions and the results of L. Xiang *et al.* (2025) on the effectiveness of cognitive-behavioural approaches additionally confirmed the appropriateness of combining psychoeducation, self-regulation and practical stress-coping skills.

The provision of A.S. Masten (2001) on "ordinary magic" was consistent with the obtained results in that respondents' resilience was associated not with exceptional personality qualities, but with everyday skills of self-regulation, maintenance of social connections and meaning-based organisation of experience. The conclusions of I.R. Galatzer-Levy *et al.* (2018)

regarding different trajectories of adaptation correlated with the identified differences between groups, which demonstrated either stable resilience or gradual recovery after stress. The results were also consistent with the interdisciplinary position of S.M. Southwick *et al.* (2014), who emphasised the combination of psychological, biological and social determinants of resilience. In this study, this relationship was traced through the interaction of cognitive flexibility, emotional regulation, social support and professional context. The ideas of S.S. Luthar *et al.* (2000) regarding the need to clearly define risk and positive adaptation were taken into account through the specification of inclusion criteria, respondent subgroups and indicators of mental functioning. Thus, psychological resilience emerged as a multilevel system of self-regulation in which protective, restorative and developmental mechanisms were in dynamic interaction. The protective function consisted in reducing the negative impact of stressful and traumatic factors; the restorative function involved returning to psychological balance and professional effectiveness; and the developmental function consisted in the ability to transform crisis experience into a source of personal growth.

■ Conclusions

The conducted study confirmed that psychological resilience acted as an adaptive mechanism for supporting an individual's mental health under conditions of prolonged stress, wartime challenges and social uncertainty. Statistically significant correlational relationships were identified between the level of resilience and emotional stability ($r = 0.61$; $p < 0.01$), reduced anxiety ($r = -0.54$; $p < 0.01$) and subjective well-being ($r = 0.58$; $p < 0.01$). The descriptive indicators for CD-RISC-10 ($M = 27.8$; $SD = 6.3$; $Me = 28.0$) and BRS ($M = 3.51$; $SD = 0.70$; $Me = 3.50$) indicated the predominance of a moderate level of psychological resilience and a moderate ability to recover after stress exposure. Thus, resilience performed a buffering function in relation to stressogenic and traumatic influences, supported emotional balance and contributed to the preservation of life capacity. The structure of resilience encompassed cognitive-regulatory, emotional-motivational and social-communicative components. Their interaction ensured the individual's ability to assess a situation realistically, regulate emotional reactions, maintain motivation for action and use social support resources. The comparative description of the subgroups showed that, among personnel of the security and defence sector, organisational support, unit cohesion and clarity of professional algorithms acquired leading importance; among educators, healthcare workers and psychologists, emotional self-regulation skills and professional reflection were central; among volunteers, value-based motivation, social involvement and a sense of usefulness were significant; among internally displaced persons, stable social support, predictability and restoration of a sense of safety were important; and among civilians affected by war-related events, the ability to recover emotionally, reinterpret experience and maintain everyday functionality was particularly relevant. The results should be interpreted with consideration of the study limitations: the purposive nature of the sample, the self-report format of data collection and the correlational design, which did not allow cause-and-effect relationships to be established. Prospects for further research are related to expanding the sample, clarifying age-related and professional differences in resilience, and evaluating the effectiveness of specialised resilience-building programmes under conditions of wartime and post-war recovery.

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Психологічна резильєнтність як адаптивний механізм підтримки ментального здоров'я особистості

Юлія Бойко-Бузиль
Доктор психологічних наук, професор
Національна академія внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ
https://orcid.org/0000-0002-1715-4327

■ **Анотація.** Актуальність теми зумовлена потребою в науково обґрунтованих підходах до зміцнення психічного благополуччя осіб, які тривалий час функціонували в стресогенному середовищі та зазнавали впливу воєнних подій, вимушеного переміщення, втрат, професійного навантаження й невизначеності майбутнього. Мета статті полягала в теоретичному обґрунтуванні й емпіричному уточненні ролі резильєнтності в підтриманні ментального здоров'я, а також у визначенні її структурних компонентів і соціально-психологічних детермінант. Основу дослідження становили результати психодіагностичного вивчення 214 респондентів, серед яких були працівники сектору безпеки й оборони, освітяни, медики, психологи, волонтери, внутрішньо переміщені особи та цивільні, які зазнали впливу воєнних подій. Використано шкали CD-RISC-10 і BRS, описову статистику, аналіз підгруп і кореляційний аналіз Пірсона. Описові показники засвідчили переважання середнього рівня резильєнтності та здатності до відновлення: CD-RISC-10 M = 27,8 (SD = 6,3; Me = 28,0), BRS M = 3,51 (SD = 0,70; Me = 3,50). Встановлено статистично значущі зв'язки між резильєнтністю й емоційною стабільністю ($r = 0,61$; $p < 0,01$), нижчим рівнем тривожності ($r = -0,54$; $p < 0,01$) і суб'єктивним благополуччям ($r = 0,58$; $p < 0,01$). З'ясовано, що особи з вищими показниками резильєнтності частіше демонстрували активні копінг-стратегії, когнітивну переоцінку стресових подій, готовність звертатися за соціальною підтримкою та здатність підтримувати функціональність у складних умовах. У групах, які зазнали впливу війни або вимушеного переміщення, резильєнтність виконувала буферну функцію, послаблюючи психологічні наслідки травматичних подій і знижуючи ризик емоційної дезадаптації. Акцентовано, що резильєнтність залежала від взаємодії когнітивно-регуляційного, емоційно-мотиваційного та соціально-комунікативного компонентів, а також від доступності підтримувального соціального й організаційного середовища. Результати засвідчили доцільність формування резильєнтності через поєднання індивідуального розвитку навичок саморегуляції з груповими й організаційними формами психологічної підтримки. Отримані дані можуть бути використані для розроблення психопрофілактичних програм, ресурсно-орієнтованих тренінгів і систем динамічного моніторингу ризиків ментального здоров'я в різних соціально-професійних групах

■ **Ключові слова:** стрес; саморегуляція; копінг-стратегії; соціальна підтримка; воєнна травматизація; адаптивний потенціал

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Адреса видавництва:
Національна академія внутрішніх справ
03035, пл. Солом'янська, 1, м. Київ, Україна
Тел.: +38 (044) 520-08-47
E-mail: info@lawscience.com.ua
https://lawscience.com.ua/uk

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03035, 1 Solomianska Sq., Kyiv, Ukraine
Tel.: +38 (044) 520-08-47
E-mail: info@lawscience.com.ua
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