

USE OF SPECIAL KNOWLEDGE IN THE INVESTIGATION OF CRIMINAL OFFENCES AGAINST PEACE AND SECURITY OF MANKIND

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Abstract

The article highlights the role of specialized knowledge in the investigation of criminal offenses against the peace and security of mankind in conditions of large-scale aggression, emphasizing the interdisciplinary nature of examinations and the need for their harmonization with international standards of evidence. The focus is on the combination of forensic, DNA, explosives, ballistic, environmental, linguistic, psychological and digital examinations as a basis for forming a holistic evidentiary picture. The importance of modern technologies, in particular satellite analytics, 3D modeling, big data and mobile DNA laboratories, for the operational documentation of crimes and increasing the reliability of evidence is substantiated. Legal and organizational barriers associated with the recognition of the conclusions of foreign experts, ensuring the chain of custody of evidence and access to crime scenes are highlighted. Areas of improvement are proposed: accreditation of international experts, unification of methodologies, development of interdisciplinary educational programs and standardization of work with digital evidence. The prospects for the integration of artificial intelligence and cyber expertise are shown under the condition of ethical and procedural guarantees. The results have practical significance for increasing the efficiency of national investigations and the admissibility of evidence in international proceedings.

Keywords: criminal proceedings, special knowledge, investigation, criminal offenses, human security, war crimes, forensic examination, analytics.

1. Introduction

The relevance of the study of the use of special knowledge in the investigation of criminal offenses against the peace and security of humanity is due to the large-scale challenges of modernity caused by military aggression on the territory of Ukraine. A full-scale war is accompanied by numerous war crimes, crimes against humanity and other violations of international humanitarian law, which require proper legal assessment and effective criminal prosecution. In this context, special knowledge is of key importance, without which it is impossible to establish the factual circumstances of the committed illegal acts and their proper documentation.

The peculiarity of criminal offenses against the peace and security of mankind lies in their complexity and international nature, which requires the integration of various types of expert research - from forensic to environmental and linguistic. The use of specialized knowledge allows establishing the truth in conditions of a shortage of direct evidence, typical of combat zones, and providing an evidentiary base that meets the standards of international judicial institutions, in particular the International Criminal Court.

It is worth noting that the increase in the number of war crimes and their scale necessitate a systematic analysis of modern forensic capabilities. Documenting the facts of the use of weapons of mass destruction, identifying victims of genocide and identifying persons involved in crimes against humanity are impossible without the involvement of specialists of various profiles. This makes the issue of interaction between investigators, prosecutors and experts in criminal proceedings relevant. An additional factor of relevance is the need to harmonize national legislation with international legal standards. Ukraine participates in the investigation of crimes of an interstate nature, in cooperation with the International Criminal Court, the UN, Eurojust and other institutions. In this context, the use of specialized knowledge should ensure the universality of the evidentiary base, suitable for both national and international trials.

The purpose of the article is a comprehensive study of the role and significance of specialized knowledge in the process of investigating criminal offenses against the peace and security of mankind. It involves the analysis of national and international legal regulation of the use of specialized knowledge, the definition of typical types of expertise, as well as the identification of problems and prospects for their application in conditions of military aggression.

The main objectives of the study are: to outline the concept of "special knowledge" in the criminal process; to characterize international and national legal standards for proving crimes against the peace and security of mankind; to analyze the practice of ordering and conducting expertise; to identify problems that arise when documenting crimes during wartime; to formulate proposals for improving the mechanism for using specialized knowledge in the investigation of these crimes.

2. Theoretical and legal foundations of the study

In modern conditions, the scale of war crimes, crimes against humanity and ecocide has exceeded the traditional capabilities of national criminal prosecution systems, which emphasizes the need to use interdisciplinary methods and technologies. In particular, studies by Ukrainian scientists indicate the effectiveness of DNA analysis, digital technologies and forensic methods in the Ukrainian context (Shevchuket al., 2025, p. 45).

Special knowledge is knowledge professionally acquired by a person in various spheres of life. Regarding the criminal procedural aspect, this is scientific, technical and other special knowledge that is the basis (in relation to specialists) or one of the grounds (in relation to experts) for involving persons who possess them to provide consultations or conclusions during the investigation of a criminal offense (Kreminsky & Omelchuk, 2022, p. 186). Special knowledge in criminal proceedings is used in various forms. Most scholars, inclined to classify by the basis of procedural regulation, distinguish between procedural and non-procedural forms, and some also distinguish between mixed forms (Shramko, 2021, p. 53).

The main procedural form of using special knowledge in criminal proceedings is an examination. The procedural procedure for appointing examinations is regulated by Art. 242–245 of the Code of Criminal Procedure of Ukraine. According to Part 1 of Art. 242 of the Code of Criminal Procedure of Ukraine, an examination is conducted by an expert at the request of a party to criminal proceedings or by order of an investigating judge or court, if special knowledge is required to clarify circumstances that are important for criminal proceedings. An examination is not allowed to clarify issues of law (Criminal Procedure Code of Ukraine, 2012).

Special knowledge in the framework of forensics is not only a set of industry expertise (forensic, explosives, environmental, linguistic, etc.), but also the ability to integrate digital and technological tools into the evidentiary process. It is important to consider that the International Criminal Court (ICC) fund provides for the involvement of "external non-witness experts" on the basis of Art. 15 of the Rome Statute, and expert opinions prepared in Ukraine can be transferred to the ICC within the framework of cooperation (Art. 93) (Evidence in the International Criminal Court, 2022, p. 119).

The growth in the number of war crimes creates a conflict situation for the national system: on the one hand, speed and efficiency are needed, on the other hand, ensuring standards of evidence

adequacy. That is why the need to harmonize national procedures with international requirements comes to the fore. This challenge has been particularly acute in documenting crimes in combat zones: digital evidence, satellite imagery, and open-source archival media are no longer optional but mandatory components of the evidence base.

Ukrainian practice demonstrates unique approaches to collecting digital evidence. Chatbots and databases for collecting video, photos, audio, and testimonies, supported by Palantir and Microsoft technologies, are actively used. These tools allow for the systematization of data sets, analysis, and storage in a format suitable for further use in court (How Ukraine is Pioneering New Ways, 2023).

At the same time, international assistance plays a special role, including mobile DNA laboratories, 3D scanners, drones, and analytical platforms. This makes it possible to quickly identify victims, document damage, and reconstruct crime scenes. In particular, with the participation of French experts working with mobile DNA laboratories, 447 bodies in Bucha were identified, which significantly accelerated the investigation process (Ukraine: International Support, 2023).

The use of the latest technologies in the field of forensics also ensures high accuracy of traceological, explosive and environmental examinations. 3D modeling of destruction allows to reconstruct the situation at the crime scene, and digital databases of weapons help to identify specific samples used during attacks. This is important for both national proceedings and international courts.

However, the involvement of foreign experts is complicated at the level of legal regulation. Ukrainian legislation does not allow the direct use of expertise of foreign citizens in national courts, although international bodies such as the ICC recognize such evidence (Evidence in the International Criminal, 2023, p. 121). This creates a regulatory gap that needs to be resolved.

One of the directions for solving this problem could be the creation of special procedures for the accreditation of international experts in Ukraine. Such a mechanism would ensure a balance between compliance with national requirements for the admissibility of evidence and the need to use foreign experience and technical resources in investigations.

An additional challenge is to ensure the proper level of training of Ukrainian investigators and prosecutors in the field of working with high-tech evidence. Interdisciplinary educational programs are needed that combine knowledge of criminology, information technology, international law and forensic medicine. This will allow not only to integrate specialized knowledge into the evidence base, but also to make it more convincing for international judicial bodies.

Thus, the modern model of using specialized knowledge in the investigation of crimes against the peace and security of mankind in Ukraine is the result of the interaction of national practices, international assistance and innovative technologies. At the same time, the need to improve regulatory regulation and harmonization with international standards remains a key task in the near future.

3. Using specialized knowledge in the investigation of crimes against the peace and security of mankind

In the current conditions of a large-scale war against Ukraine, the involvement of specialized knowledge for documenting and recording war crimes, crimes against humanity and other crimes against the peace and security of mankind is of particular importance. Using the capabilities of forensics, forensic medicine, ballistics, IT expertise and other areas of scientific knowledge allows us to ensure the objectivity and completeness of the evidence base. This, in turn, is a guarantee of bringing the perpetrators to justice in both national and international jurisdictions (Kaplina, 2023, p. 218).

Documenting war crimes in a combat zone has its own specifics, due to the danger for investigative teams, the rapid change of the situation and the scale of destruction. In such conditions, it is important to use the latest technical means - aerial photography, satellite images, digital technologies for collecting and storing information. This contributes to the formation of evidence

that has a high degree of reliability and can be verified by international experts (Sergienko, 2022, p. 145).

A feature of recording evidence in a combat zone is the need for a prompt response to the facts of war crimes. For example, when investigating mass graves, timely exhumation of the bodies of the deceased, in compliance with international protocols and involving forensic experts, is important. Proper recording of bodily injuries, analysis of traces of explosive devices and weapons are key to proving the use of prohibited methods of warfare.

An important challenge for investigative bodies is to preserve the authenticity of evidence. In international courts, the origin or reliability of the collected materials is often questioned, so the role of experts is to confirm the chain of custody. This requires strict adherence to standards and protocols agreed upon with international organizations.

The role of experts in the process of establishing the objective truth in cases of crimes against the peace and security of mankind cannot be underestimated. Expert opinions often become key evidence that determine the qualification of a crime and the degree of guilt of specific individuals. It is thanks to comprehensive examinations that it is possible to establish not only the fact of the crime, but also its scale and organization.

The involvement of specialists is interdisciplinary: in addition to forensic doctors and criminologists, experts in international humanitarian law, psychologists, and specialists in data analysis and information systems are needed. This approach is consistent with international practices in investigating war crimes, in particular the experience of the Tribunal for the former Yugoslavia.

International cooperation in the field of expert involvement is of particular importance for Ukraine. Joint investigation teams, which include representatives of the International Criminal Court, Eurojust and individual partner states, allow to increase the efficiency of investigations and ensure their legitimacy at the international level (Groenhuijsen & Pemberton, 2021, p. 97).

The issue of coordinating the activities of national and international experts requires special attention. For this purpose, special interaction protocols are used that allow to avoid duplication, to harmonize research methodology and to guarantee the recognition of the results of expertise in international courts.

The theoretical and legal principles of applying specialized knowledge in this area are formed at the junction of criminal procedural law, international humanitarian law and the practice of international criminal tribunals. They provide for the mandatory scientific validity of expert opinions (Sander, 2020, p. 374; Ashbridge, 2022), compliance with procedural guarantees of the parties and ensuring the rights of victims.

The current practice of Ukraine indicates the need for legislative consolidation of standards for the collection and use of evidence obtained with the help of specialized knowledge, including using innovative technologies. Such an approach will allow adapting national legislation to international requirements and strengthening Ukraine's position in future international processes.

The ethical aspect is also important: experts working in a combat zone must adhere not only to procedural norms, but also to humanitarian principles. This includes respect for victims, avoiding re-traumatization of witnesses and victims, as well as ensuring the confidentiality of information.

Thus, the use of specialized knowledge in the investigation of crimes against the peace and security of mankind is a key factor in the formation of an adequate evidentiary base. A systematic approach to the use of scientific knowledge, international cooperation, and adherence to high ethical and legal standards create the prerequisites for effective justice and ensuring the inevitability of punishment of the guilty.

4. Appointment and conduct of typical examinations

In the context of mass burials and identification of war victims, forensic and DNA examinations acquire special significance. They play a key role in establishing the causes of death, the extent of

injuries, as well as in the process of personal identification of the deceased. This is especially important for ensuring the right of families to bury their relatives and for fulfilling Ukraine's international legal obligations in the field of humanitarian law. Establishing the identity of the victim is also of direct importance for the qualification of crimes, as it allows for a clear determination of the number of victims and the scale of the crime.

The use of modern technologies, in particular mobile DNA laboratories provided to Ukraine by international partners, significantly increases the efficiency of the work of experts. Such laboratories allow for quick and accurate analyses directly in the combat zone, which minimizes the risk of material loss and reduces the time for conducting research. This creates a reliable evidence base for further investigations and international prosecution of those guilty of war crimes.

Explosives examinations are extremely important for fixing the facts of the use of weapons. They are aimed at establishing the nature of explosive devices, their design features, as well as the origin of ammunition. As a result, experts are able to determine whether means prohibited by international law were used, which is an important argument in war crimes trials.

Ballistic studies, in turn, allow you to recreate the circumstances of the use of firearms. They help establish the type of weapon, the trajectory of bullets, the distance of shots and other details that help reconstruct the picture of the crime. This allows not only to identify the weapon of the crime, but also to link it to specific individuals or units that could have been involved in committing illegal actions.

Modern methods of analyzing traces of explosions are actively used in Ukraine, including the use of highly sensitive devices for detecting microparticles of explosives. Such studies contribute to collecting data on the origin of ammunition and establishing the facts of their use in specific cases. This is especially relevant in conditions of large-scale aggression, when it is important to prove the use of certain types of weapons by the army of the aggressor state against the civilian population.

The complex application of forensic, DNA, explosive and ballistic examinations forms a holistic system of evidence, which is critical for documenting war crimes. In combination with international standards of forensic research, this creates a basis for preparing materials for international courts, in particular the International Criminal Court. Thus, modern forensic expertise becomes not only an instrument of justice within the country, but also an effective mechanism of international responsibility.

The use of prohibited types of weapons of mass destruction has not only a humanitarian, but also a complex environmental dimension, which is manifested in long-term consequences for ecosystems. Chemical agents are able to accumulate in soil and water, causing long-term degradation of the natural environment and making it impossible to restore it without large-scale remediation measures. Biological weapons, in turn, can cause mutations in pathogenic microorganisms, which poses a threat to biodiversity and human health for several generations (Eliopoulos, 2023).

The use of nuclear weapons occupies a special place among environmental threats, since its consequences are not limited to direct damage to the territory, but lead to global climate change. Radioactive contamination spreads through atmospheric and hydrological processes, covering regions remote from the epicenter of the explosion. This requires the involvement of international mechanisms for control and coordination of efforts to overcome the consequences, since no state is able to effectively eliminate threats of this scale on its own.

In this context, environmental and radiological expertise is an important tool both for the criminal legal qualification of actions related to the use of weapons of mass destruction, and for the development of environmental security strategies. Establishing a causal link between the fact of the use of prohibited weapons and its environmental consequences allows for the formation of an evidentiary base for international courts. This also contributes to the strengthening of international legal mechanisms aimed at prohibiting and preventing the use of such weapons in the future (Cheng, L., & Zhang, 2021, p. 320-321).

Thus, a modern approach to the analysis of the environmental consequences of the use of weapons

of mass destruction requires a comprehensive interaction between environmental law, international humanitarian law and criminal law. The use of interdisciplinary research methods allows not only to identify the extent of the damage caused, but also to prepare sound recommendations for improving national and international mechanisms for environmental and radiation safety (Falk, R. A., & Akhavan, 2022, p. 62).

Linguistic and psychological examinations are used to analyze propaganda materials that may indicate incitement to commit genocide or other war crimes. Analysis of the language used in such materials allows us to identify the presence of calls for violence, hatred and discrimination, which is a basis for holding those who spread them accountable (Holovach, 2024; Jones, 2011).

In this context, it is worth emphasizing that it is linguistic and psychological examinations that create the basis for the legal qualification of actions aimed at spreading hateful ideas. They help to separate value judgments from direct calls for discrimination or violence, which is of significant importance for distinguishing between permissible freedom of expression and illegal behavior. Thus, examinations become a kind of bridge between scientific analysis and legal response.

In addition, the study of the psychological aspects of propaganda texts allows us to assess their impact on the consciousness and behavior of the target audience. The establishment of manipulative techniques that form feelings of hatred or a desire for revenge helps to substantiate the intentional nature of actions disseminators of such information. This, in turn, strengthens the evidentiary base in cases of war crimes and genocide.

It is also worth noting that the practice of international judicial institutions, in particular the International Criminal Tribunal for Rwanda, demonstrates the importance of linguistic expertise in proving the fact of incitement to genocide through the mass media. A similar approach is gradually being formed in Ukraine, which meets international standards of criminal liability for crimes against the peace and security of mankind.

In modern conditions of war, considerable attention is paid to technical and digital expertise, since it is they who provide a qualitatively new level of evidentiary base in criminal proceedings. Such expertise allows you to gain access to information stored on mobile phones, laptops, servers or cloud storage, as well as restore deleted files, messages, contacts and other digital traces. In many cases, this data becomes key to establishing the circumstances of the crime, identifying individuals, as well as confirming or refuting the testimonies of participants in criminal proceedings.

An important direction is the use of digital forensics to analyze geolocation data and satellite images. They allow you to determine the movements of suspects, the place of commission of a crime or the circumstances of its preparation, which is especially relevant in wartime. Such materials are increasingly recognized as appropriate and admissible evidence in courts, including international ones, where they are used to confirm the facts of war crimes. The use of satellite analytics and big data technologies makes it possible to track mass destruction, shelling or other acts of aggression with a high level of accuracy.

Special attention is paid to forensics in the field of cybersecurity, which is related to the investigation of cyberattacks, data interception or unauthorized access to information systems. Such crimes as data theft, blocking of information resources or interference in the functioning of critical infrastructure, in modern conditions of war become a tool of hybrid aggression. Expertise in this area allows us to establish the source of the attack, the methods of penetration and the extent of the damage caused, which is necessary both to bring the perpetrators to justice and to prevent repeated crimes.

Technical expertise, in particular photo and video, is no less important, which allows us to analyze the authenticity of images and videos. In the context of the spread of disinformation and the manipulative use of digital content, such studies help determine whether the materials have been edited, edited or falsified. This increases the level of confidence in the evidence and ensures its procedural value.

In general, it can be stated that technical and digital expertise in wartime conditions becomes one of the most important tools in the field of criminal justice. They not only increase the efficiency of investigations, but also create conditions for integrating the results of national criminal proceedings into international justice mechanisms. The use of the latest technologies in expert activities ensures the objectivity of the evidence base and contributes to the establishment of justice even in extremely difficult wartime conditions.

An important aspect of conducting expert examinations in the investigation of war crimes is international cooperation. The involvement of international experts and the use of international standards ensure the objectivity and reliability of the results of the examinations. Ukraine actively cooperates with international organizations, such as the International Criminal Court, to conduct joint expert examinations and exchange experience. Despite the importance of expert examinations, there are certain challenges and problems in their conduct. Among them are limited resources, lack of necessary equipment, danger to experts in the combat zone, as well as legal and organizational barriers that limit the effectiveness of expert examinations.

5. Challenges and prospects for the use of specialized knowledge in the investigation of war crimes

In modern conditions, the use of specialized knowledge in the investigation of war crimes faces a number of challenges. In particular, the lack of proper legislative regulation of the use of foreign experts in national trials creates a legal vacuum that complicates the integration of international experience into domestic practice. In addition, limited access to crime scenes, especially in areas of active hostilities, complicates the conduct of necessary examinations and collection of evidence. This, in turn, reduces the effectiveness of investigations and complicates the process of proving in court (Shevchuk & Avdeeva, 2023, pp. 495-496).

The use of modern technologies, such as artificial intelligence (AI), digital forensics and satellite data, opens up new opportunities for increasing the efficiency of investigations. In particular, AI can be used for automated analysis of large volumes of data, identifying patterns and predicting possible scenarios of events.

However, the implementation of AI in forensic practice requires solving a number of problems. Among them are the need to develop ethical standards for the use of AI, ensuring the transparency of algorithms and protecting human rights. Also important are the issues of responsibility for decisions made with the help of AI, and the possibility of appealing such decisions in court.

International cooperation in the field of forensics and the use of specialized knowledge is an important aspect in the fight against war crimes. Exchange of experience, joint training and coordination of actions between countries can increase the effectiveness of investigations and ensure the appropriate level of evidence base (Shevchuk & Avdeeva, 2023, p. 498).

However, there are also difficulties in international cooperation. Differences in legislative systems, standards of evidence and procedural approaches can complicate interaction between countries. Therefore, it is important to develop uniform international standards and protocols that allow for effective cooperation and mutual recognition of the results of examinations (Dufenyuk, 2022, p. 50).

In modern conditions, a strategically important task for Ukraine is the harmonization of national forensic practice with European standards. This involves bringing legislation into line with European Union norms, unifying examination methods, and improving the professional level of experts. The use of the latest technologies, such as satellite imagery, drones, and analytical digital systems, opens up the possibility of high-quality documentation of crimes even in hard-to-reach or remote regions. This approach ensures a more complete collection of evidence and the formation of a reliable evidence base for judicial proceedings. At the same time, the implementation of these technologies is associated with the need for significant material and technical costs. Therefore, the development of effective financing mechanisms, as well as ensuring equal access to the necessary

equipment for all participants in the investigation process, is of particular importance. No less important is systematic training and continuous professional development of specialists working with such tools.

In the long term, the active development of artificial intelligence and other digital technologies can significantly increase the effectiveness of war crimes investigations. At the same time, to achieve this goal, it is necessary to overcome existing difficulties, create an appropriate regulatory framework and strengthen international cooperation, which will contribute to the integration of best practices and the exchange of experience (Dufenyuk, 2022, p. 51). Only by combining national and international experience, integrating modern technologies and using highly qualified experts can significant progress be achieved in the fight against war crimes and ensuring justice for victims.

So specialized knowledge and modern technologies are critically important in the investigation of war crimes. At the same time, their effectiveness depends on resolving legislative, organizational and financial problems, as well as on the development of international cooperation and the implementation of uniform standards of expert activity.

Conclusions

The study has demonstrated the key role of specialized knowledge in modern criminal justice, especially in conditions of military conflicts and mass violations of international humanitarian law. The use of interdisciplinary expertise – from forensic and forensic to digital and environmental – ensures the objectivity and comprehensiveness of the evidence base. The scientific novelty lies in the integration of the latest technologies (satellite analytics, big data, mobile DNA laboratories) into the national practice of investigating war crimes, which demonstrates Ukraine's ability to form its own innovative models of forensics. This creates a basis for international recognition of the evidence obtained and increasing the efficiency of justice.

The practical significance of the study is manifested in the formation of approaches to harmonizing national legislation with the standards of international criminal tribunals. The development of accreditation procedures for foreign experts, the unification of examination methods, and the creation of interdisciplinary educational programs will increase the capacity of national authorities to document crimes. Systematic cooperation with the International Criminal Court, Eurojust, and other institutions will contribute to the legitimacy and international recognition of the results of Ukrainian investigations. In this aspect, the use of specialized knowledge becomes an important tool for strengthening trust in justice and strengthening the international authority of Ukraine.

At the same time, the study revealed significant challenges: imperfect regulatory framework, limited access to crime scenes, risks for experts, as well as material and technical limitations. Solving these problems requires the development of national strategies for the development of forensic expertise, the creation of special funds for financing technical support and advanced training of specialists. An important direction is also the development of coordinated international protocols for evidentiary activities, which will reduce the difference in the approaches of different legal systems. This will ensure the admissibility of evidence in international criminal proceedings and make it impossible for the perpetrators to evade responsibility.

The prospects for further research lie in the development of mechanisms for the use of artificial intelligence, automated processing of digital evidence and cyber-expertise in criminal proceedings. Along with technological progress, it is important to develop ethical and procedural standards for their application in order to avoid abuses and ensure the protection of human rights. Thus, only a combination of specialized knowledge, modern innovative technologies, and international cooperation can be a guarantee of effective documentation of crimes against the peace and security of humanity, fair trial, and the inevitability of punishment for the guilty.

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