

Comparative analysis of models of organisation of forensic activities: International experience

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Abstract. The purpose of the study was to identify the main models of organisation of the forensic system in Ukraine and to assess international experience in the field of expert support of justice, as well as to analyse ways to adapt modern world standards to national expert practice. The theoretical basis of the study was the documents defining the status and organisation of forensic experts in Ukraine, Latvia and the Czech Republic. The functions related to forensic examinations, examination, and seizure were analysed. It was revealed that the organisation of forensic expert activity in European countries is focused on creating an effective system of expert institutions and ensuring optimal conditions for conducting examinations by qualified specialists who are appropriately accredited and included in the official registers of forensic experts. It was emphasised that in Ukraine there is a mixture of two approaches to structuring forensic expert activity. The advantages of such a mixed model include harmonisation of forensic examinations, standardization of expert methods, accreditation of forensic laboratories and publicity of the register of forensic experts. The author substantiated the need to integrate the Ukrainian system of expert support of justice into the international context and to participate Ukrainian forensic institutions in international organisations that bring together foreign expert institutions. This will help to improve the procedures for the participation of forensic experts in justice. The author proposed to establish a single body – the National Service for the Provision of Forensic Expertise, which will be

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subordinated to the Ministry of Justice of Ukraine. Thus, the practical significance of the study is that its results can be used to centrally address the problem of methodological and information support of expert activity, which in turn will improve the organisation of forensic activities in Ukraine

Keywords: forensic examination; expert support of justice; specialised knowledge; expertology; international experience

Introduction

Forensic expert activity is central to the legal system of any country, as the results of examinations have a significant impact on the judicial decision-making process. In this regard, the efficiency and quality of forensic activities are critical to ensuring a fair and objective trial in courts. This underscores the need to continuously improve the organisational and technological aspects of expert activity, as well as to integrate international best practices to improve the justice system. Due to the full-scale invasion of Ukraine by the Russian Federation in 2022, there was a significant need for various forensic examinations. This became important to establish the facts and circumstances related to the loss of life, damage to infrastructure, property and environmental destruction, in order to document war crimes committed by representatives of the aggressor state and bring the perpetrators to justice. For example, from 1 March to 31 May 2024, at least 436 civilian deaths and 1,760 injuries were recorded (United Nations, 2024). Due to the active hostilities and limited access to the territories of Ukraine temporarily occupied by the Russian Federation, these data are incomplete. This situation has significantly increased the burden on state specialised institutions, which, according to Article 7 of the Law of Ukraine No. 4038-XII "On Forensic Expertise" (1994), have the exclusive right to conduct forensic, forensic medical and forensic psychiatric examinations. Thus, Optimisation of forensic work during the war required the development of effective strategies to preserve and develop scientific and technical potential.

Many scholars have studied the models of organisation of forensic activities. S. Korniyko (2020), O.G. Ruvin (2020) and V.O. Mykhailov (2023), emphasised that different countries have consistently implemented the principles of ensuring the independence of the expert, focusing on his or her special knowledge necessary to perform the tasks of justice, and the principle of competition of experts, which is crucial to ensure an objective, independent and qualified examination. S. Koropetska and V. Savchenko (2022) and V. Levchenko (2023) argued that the tasks of an expert in any country are the same: using their specialised knowledge, to conduct an examination that will contribute to the resolution of legal disputes or conflict situations. In view of this, it is worth emphasizing that international cooperation between forensic institutions is necessary for the exchange of knowledge and the incorporation of modern scientific and technical achievements, as well as for the creation of specialised areas. Ukrainian forensic institutions have chosen the path of integration with international forensic organisations, which contributes to improving the quality of forensic activities in Ukraine (Vozniuk & Hryha, 2023). The European integration course envisages the introduction of international standards in the field of forensic science.

According to K. Shunevych (2023), A.Y. Lebedenko and I.S. Volokhova (2023), N. Tkachenko and V. Aleksei-chuk (2022), using the experience of European countries in creating a separate forensic institution, which will allow concentrating forensic examinations within one agency. This will

indeed provide an opportunity to implement an integrated approach to solving organisational, managerial, regulatory, personnel and financial issues, which will increase the efficiency and effectiveness of forensic activities. Works by A. Biju *et al.* (2021), B. Kumar *et al.* (2022) and B. Budowle (2023) are devoted to the problems of organising forensic activities in the process of criminal prosecution and improving the procedure for obtaining evidence in criminal proceedings.

The contribution of the above-mentioned scholars to the development of doctrinal research in the field of forensic science in Ukraine is undeniable. However, the issues of organisation and operation of forensic institutions remain insufficiently researched, especially with regard to the adaptation of the positive experience of such countries as the UK, France, and Poland into the national law enforcement system. Thus, the study and implementation of successful practices of the operation and functioning of forensic institutions abroad is extremely relevant. It should be emphasised that copying the legislation of other countries, in particular the members of the European Union (EU), without taking into account the Ukrainian mentality and the peculiarities of the national specifics of the development of forensic science and the organisational structure of forensic institutions is not effective. The purpose of this study was to conduct a comparative analysis of the models of organisation of forensic activities in Ukraine and other countries of the world.

Materials and methods

The study analysed regulatory and legal acts to assess the current state of the problem and identify possible solutions. Thus, in the course of scientific analysis and for a full understanding and substantiation of the issue, the rules from various legal sources were used, in particular: Law of Ukraine No. 4038-XII "On Forensic Expertise" (1994), Order of the Ministry of Justice of Ukraine No. 1138/5 "On Certain Issues of Ensuring Forensic Expert Activity under Martial Law" (2022), Resolution of the Cabinet of Ministers of Ukraine No. 710-96-p "On Approval of the Instruction on the Procedure and Amounts of Compensation (Reimbursement) of Expenses and Remuneration to Persons Summoned to Pre-trial Investigation Authorities, Prosecutor's Office, Court, or Authorities in Possession of Cases on Administrative Offences, and Payments to State Specialised Forensic Institutions for Performing the Functions of Experts and Specialists by Their Employees" (1996), Decision of the Accounting Chamber No. 28-1 "On Consideration of the Report on the Results of the Audit of the Management Efficiency of Forensic Research Institutions of the Ministry of Justice of Ukraine, Which Has Financial Implications for the State Budget" (2022), Order of the Ministry of Justice of Ukraine No. 230/5 "On Establishing the Cost of One Expert Hour in 2023" (2023), Law on Forensic Experts of the Republic of Latvia (2016), Regulation of the Cabinet of Ministers of the Republic of Latvia No. 606 "Procedures for Organising Forensic Expert-examinations" (2016), Ordinance of the Minister of Justice of the Republic of Poland No. 133 "On Court

Experts” (2005), and Law of the Czech Republic No. 254 “On Experts, Expert Bureaus and Expert Institutes” (2019).

In the course of researching this topic, a methodology was applied that allowed to provide a general description of various models of organisation of forensic activities in different countries of the world, in particular, the United Kingdom, Poland, and France, in particular, the method of legal comparative studies. The selection of the above countries is justified by their experience in developing effective models of forensic science, which differ from each other, but at the same time have common features that may be useful for adaptation to the national law enforcement system. The United Kingdom, for example, has a well-developed system of independent forensic institutions that operate under clear standards and regulations. Poland, for its part, offers an interesting experience of integrating forensic science into the law enforcement system, while France demonstrates a model with an emphasis on state control and regulation of expert institutions.

Accordingly, the inclusion of these countries in the study sample allows for a comparative analysis of different approaches to the organisation of forensic science activities, which will facilitate the development of recommendations on possible directions for the development of the national law enforcement system. Thanks to this approach, it became possible to consider in detail the peculiarities of legal regulation of forensic expert activity in the international context. The system-functional method made it possible to carry out a comprehensive assessment of the effectiveness of the current models of organisation of forensic expert activity. The analysis of international experience has made it possible to identify current trends and the state of forensic science in different countries.

The use of the system-functional method in the study of models of organisation of forensic activities allowed for a deeper understanding of the problem and the development of recommendations for improving the national system of forensic activities, in particular, in the direction of applying one of the studied models of other countries. In addition, the use of the logical and legal method in combination with other approaches has made it possible to obtain new conclusions regarding some established organisational and legal aspects. In particular, this method helped to clarify the essence and content of the key elements of the organisation of forensic activities in different countries, which contributes to a more effective integration of best practices into the national system.

The modelling method used in this study allowed us to offer recommendations for adapting these models to the specific conditions of Ukraine. This included an analysis of existing models in the context of their effectiveness and possible shortcomings, as well as the identification of the most

appropriate elements for adaptation to Ukrainian realities. The integration of proven practices and technologies that have proven effective in the international context can help Ukraine to improve the quality and efficiency of forensic science activities by ensuring better coordination and standardization within the national legal system. This, in turn, allowed for the formation of constructs that reflect modern approaches to the organisation and functioning of forensic institutions. The phenomenon classification method was used to systematize existing models according to a number of criteria, such as the legal status of experts, the organisational structure of institutions and the principles of their activities.

Results

Forensic science plays a key role in the administration of justice, as it provides objective evidence that is used in investigations and trials. The importance of this activity is due to the fact that examinations provide scientifically based information and factual data used to establish the circumstances of a case and evaluate evidence. In criminal cases, the results of forensic examinations can have a significant impact on determining the guilt or innocence of suspects, as well as on establishing the objective truth in a case. For example, DNA analysis, toxicological testing, forensic examination of traces and documents can indicate the causes of a crime, confirm or deny the existence of criminal activity, and help identify the perpetrator. In civil cases, forensic expert opinions are often used to resolve disputes involving issues such as damage assessment, property division, or medical issues affecting compensation for damages. For example, expertise can help determine the real value of property in dispute or assess the medical consequences of injuries resulting from an accident.

The efficiency and quality of this activity largely depend on the model of its organisation, which determines the structure, functions, and subordination of forensic institutions. Different countries of the world use different approaches to the organisation of forensic activities, which reflects the national peculiarities of the legal system, traditions and specific needs of society. Forensic expert activity is carried out in the course of legal proceedings with the participation of specialised state institutions, their territorial branches, municipal expert institutions, private forensic experts and other specialists (experts) in the relevant fields of knowledge, in accordance with the requirements established by the current legislation – part 1 of Article 7 of the Law of Ukraine No. 4038-XII (1994). The peculiarity of forensic expert activity lies in its research nature. The work of an expert has common features with research work, but at the same time differs in specific forms of performing tasks, which are defined by the relevant regulations (Fig. 1).

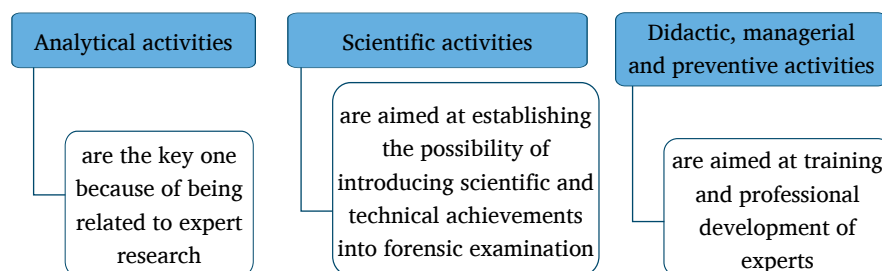


Figure 1. Types of forensic activities

Source: compiled by the authors

The organisation of the forensic science system in Ukraine is structured in four levels, including research institutions operating under the Ministry of Justice of Ukraine, the Ministry of Internal Affairs of Ukraine, the Ministry of Defence of Ukraine, the Security Service of Ukraine, the State Border Guard Service of Ukraine, the Ministry of Health of Ukraine and the State Bureau of Investigation – Article 7(2) of the Law of Ukraine No. 4038-XII (1994). The institutional system of expert institutions implements about 80 areas of expertise and covers several administrative structures at the central and regional levels. According to the Register of Certified Forensic Experts (n.d.), there are about 8000 experts in Ukraine. This system not only ensures forensic examinations, but also has significant potential in the preventive direction. Expert prognostication provided by experts provides significant support to state authorities in improving the system of restrictions, controls, and requirements aimed at preventing offences and increasing the effectiveness of preventive measures.

The system of forensic activities based on expert prognostication provides support to state authorities in improving control mechanisms, introducing new requirements and restrictions, which will directly affect the reduction of the likelihood of offences (Adanbekova *et al.*, 2022a). This may include reviewing existing procedures and introducing new measures to improve the overall effectiveness of preventive measures. An example is the experience of the United Kingdom, where forensic institutions actively use predictive models to combat economic crimes, including fraud. Through a detailed analysis of past cases and the use of predictive technologies, experts have created recommendations for strengthening regulatory requirements in the financial sector, which has helped to reduce the number of fraud cases and increase the effectiveness of law enforcement (Sandepudi, 2024). Thus, the forensic system, through its ability to predict and prevent, makes a significant contribution to improving law and order, preventing potential offences and contributing to more effective risk management at the state level.

The organisation of forensic science activities in different countries of the world is characterized by a significant variety of approaches and models. The analysis of these models allows us to identify the main advantages and disadvantages of each of them, which may be useful for improving the forensic system in other countries. In Europe, two main organisational models of forensic examination have been formed. The first model involved the involvement of specialised expert institutions that carried out forensic examinations within their specialisations (France). The second model was focused on individual forensic experts who had the appropriate certifications and were included in the official registers of forensic experts (UK). The latter organisational form, known as the institute of sworn experts, was widespread in socialist European countries in the middle of the last century. The essence of this institute was to delegate the conduct of examinations to specialists who took an oath (Poland) (Ivanović, 2018). However, there are problems associated with the organisational and procedural aspects of forensic examination, in particular, with the administrative management of forensic activities, the departmental subordination of such institutions and the degree of their centralization or decentralization. In countries such as the United Kingdom, France and Poland, the forensic service, along with other law enforcement agencies, is subordinated to the

Ministry of Internal Affairs. This structure ensures that the rule of law is upheld, and that forensic methods and tools are effectively used to detect and investigate crimes.

Countries such as the United Kingdom use a mixed model for organising forensic science. This model combines elements of both centralised and decentralised systems, which allows for uniformity of methodologies and standards while ensuring flexibility and efficiency. For example, in the UK, there is a National Forensic Science Service that cooperates with independent laboratories and the police. The UK example is the organisational structure of the Forensic Science Service (FSS) (2024), which is an executive agency of the UK Home Office and plays a key role in the police's work to detect, investigate and prevent crime. The FSS provides professional support in performing these tasks. In addition, the UK provides for the possibility of engaging private forensic laboratories to conduct certain types of examinations, which usually include forensic examination of documents. Thus, the organisation of forensic activities in the UK is based on a mixed model that combines centralised and decentralised elements. This allows for uniformity of methodologies and standards, while ensuring flexibility and efficiency in the work. The involvement of private laboratories and independent experts allows for a rapid response to the needs of investigations, adapting to specific situations. Centralised systems can indeed lead to excessive bureaucracy, which complicates and slows down decision-making processes. This issue is particularly relevant in the context of the British system, where centralization and bureaucracy have their own specific characteristics and impact on the effectiveness of governance. In particular, excessive formalization of processes and procedures can have a negative impact on the speed and efficiency of investigations (Tickell, 2022). These aspects prove that centralization and bureaucratization can have both positive and negative effects, depending on how effectively they are regulated and adapted to modern conditions. Therefore, in general, the mixed model used in the UK can serve as an example for improving forensic science in Ukraine.

In some countries, the forensic service has been integrated into the Ministry of Justice, as in Portugal, or the Ministry of Defence, which has included it in armed police forces, as in France. In France, for example, the organisation of forensic activities is based on a central model that concentrates all expert units under a single state body, in particular the National Institute of Scientific Police (INPS). All expert units operate under the guidance of a single state body, which ensures a high degree of centralization. This allows for standardization of examination methods, which guarantees consistency and high quality of results. To improve the efficiency of investigations and crime detection, France has created specialised units deployed throughout the country. This includes regional laboratories and specialised teams that work in close cooperation with local law enforcement agencies. This structure ensures that expert services are quickly available and accessible in different parts of the country (Sauvagère *et al.*, 2023). At the same time, staff involved in criminal investigations work in specialised units, such as regional laboratories, which are subordinated to INPS. They support local law enforcement agencies by providing expert services within the framework of uniform standards and methodologies. This combines the benefits of centralization with the necessary flexibility to effectively investigate and solve crimes. An analysis of this model may be

useful for Ukraine when considering possible reforms in the field of forensic science.

Some countries have a different structure and subordination of forensic laboratories. For example, in Poland, forensic laboratories are subordinated to the Ministry of Justice, while there are also laboratories under the jurisdiction of the Ministry of the Interior. The laboratories under the jurisdiction of the Ministry of Justice specialize in forensic examinations, in particular, those used in judicial investigations and criminal cases. At the same time, laboratories under the jurisdiction of the Ministry of Internal Affairs are engaged in examinations that are directly related to operational and investigative activities, including research that is important for crime investigations. This separation of jurisdiction promotes the specialisation of laboratories and allows them to focus on their specific tasks, thus providing them with deeper knowledge and expertise in their respective fields. It also reduces possible influence from law enforcement agencies, which can be important for maintaining the impartiality of experts. Nevertheless, this organisational structure has its drawbacks. The main challenge is the difficulty in coordinating between laboratories subordinated to different ministries. The absence of a single governing body makes it difficult to share information and cooperate between institutions, which sometimes leads to delays in investigations and slows down the implementation of forensic research. In addition, separate reporting lines can lead to differences in the methodologies and standards of forensic examinations, which can negatively affect the quality and consistency of results (Solodov, 2023). Bureaucratic obstacles can also be a significant impediment to the effective operation of expert institutions. Despite these challenges, the Polish model demonstrates the importance of balancing the independence of experts with the need for effective coordination between different government agencies.

Thus, the overall organisational structure of forensic science institutions in European countries may vary depending on national legislation and institutional norms. In some European Union countries (e.g. France), the executive management of forensic science activities is carried out within law enforcement agencies, in particular, through their subordination to the Ministry of the Interior. Private forensic laboratories may also be involved in some specific areas of expertise, which further expands the capabilities of the forensic support system. In some European countries, such as France, the structure of forensic laboratories may include their subordination to the Ministry of Justice or the Ministry of Defence, depending on the specific context and institutional decisions. This demonstrates the diversity of approaches to the organisation of forensic science in Europe, which is reflected in the diversity of legal frameworks and challenges faced by law enforcement agencies in each country. Thus, the consideration of the structural aspects of the forensic service in Europe shows that the development and reform of this area is aimed at ensuring high standards of justice and the effective functioning of the law enforcement system of each country.

The analysis of funding in forensic science in Ukraine has shown a systematic deficit, especially in providing experts with the necessary specialised equipment and materials for conducting examinations (Decision of the Accounting..., 2022). For this reason, the main emphasis is placed on self-directed professional development, as state funding

does not provide sufficient resources for this process. At the same time, it should be understood that according to the current Order of the Ministry of Justice of Ukraine No. 1138/5 (2022), an unscheduled inspection of the activities of a forensic expert and verification of compliance with working conditions can be carried out only in areas where there are no military (combat) operations or which are not under temporary occupation, encirclement (blockade). This may be done in the case of an application from a person who intends to obtain or confirm the qualification of a forensic expert in a particular expert speciality, or to extend the validity of a forensic expert qualification certificate. This emphasizes the need to ensure that the working conditions of forensic experts are accessible and appropriate, even in conditions of limited funding and difficult circumstances.

Given the rapid pace of technological progress and digitalization, as well as the emergence of new research methods and types of crime, expert institutions constantly need to update their technical equipment, including laboratory equipment, and software. The situation is further complicated by the fact that, according to Article 7(3) of the Law of Ukraine No. 4038-XII (1994), only state-specialised institutions are authorized to conduct forensic, forensic medical and forensic psychiatric examinations. This creates several problems in the context of the development of new research methods and the emergence of new types of crime, including limited access to innovations that state institutions cannot have. Given the rapid development of investigative technologies and methods, limiting the involvement of private experts may slow down the introduction of new effective solutions into practice. The emergence of new types of crimes, such as cybercrime or crimes involving new technologies, requires the adaptation and expansion of expert methodologies. State-specialised institutions may not have sufficient resources or expertise to implement the necessary new techniques in a timely manner. If they are the only ones authorized to conduct expertise, this may lead to delays in responding to new challenges. The state monopoly in expert activities may create risks of bias and lower quality of expertise due to the lack of competition and alternative approaches to solving expert problems. These limitations make it difficult to adapt to modern conditions and effectively apply new methods in the investigation of crimes, which is critical for the effective functioning of the forensic system. Thus, due to these legislative restrictions, non-governmental forensic institutions are unable to fully meet the need for expertise required to investigate crimes committed only by governmental organisations. On the other hand, due to objective limitations and insufficient funding, the state cannot provide full support to the entire extensive system of state-owned specialised institutions.

Currently, there are seven state forensic institutions in Ukraine that were subordinated to different ministries and agencies, including the Ministry of Justice, the Ministry of Internal Affairs, the Security Service, the Ministry of Health, the Ministry of Defence, the State Border Guard Service and the State Bureau of Investigation – Article 7(2) of the Law of Ukraine No. 4038-XII (1994). This meant that there were separate expert services in each of these bodies. Each of these institutions had its own expert qualification commissions, educational and scientific resources, expert training programmes, accounting databases, registers, developed methodologies and departmental instructions. Another problem

was that many public and private forensic experts in Ukraine faced low salaries, which led to an outflow of qualified specialists abroad and a general decline in the quality of expertise in the country. Therefore, the issue of the economically justified cost of an expert hour required urgent resolution. In accordance with paragraph 12 of Resolution of the Cabinet of Ministers of Ukraine No. 710-96-p (1996), the cost of conducting examinations in criminal cases and administrative offences was determined on the basis of the standard cost of one expert hour, which was UAH 378.64. This number corresponded to the actual time spent on the examination. However, pursuant to the Order of the Ministry of Justice of Ukraine No. 230/5 (2023), the new cost per expert hour was set at UAH 238.98, taking into account the consumer price index for 2022. Given the maximum workload (22 working days per month, 8 hours per day), an expert could expect a salary in excess of UAH 40,000.

The situation with state experts was similar. Audits conducted to assess the managerial efficiency of forensic research institutions have repeatedly revealed a discrepancy between the actual cost of expert services and their official valuation. These services included not only labour costs, but also the costs of utilities, building maintenance and consumables, which were not covered in full. Renovation of the material and technical base was often carried out at the expense of special funds. In the Decision of the Accounting Chamber No. 28-1 (2022), it was noted that there is a problem of insufficient funding of public institutions. It also emphasised the need to determine the economically justified cost of one expert hour for conducting examinations in criminal and administrative proceedings. This was also exacerbated by the aggravation of the situation due to the Russian aggression, which forced many qualified specialists, including those who spoke foreign languages and had international certificates, to leave the country in the first months of the conflict and find new jobs abroad. To solve this problem, it is necessary to review the existing approaches to the financing of forensic activities in Ukraine. Optimising the staffing of expert institutions will increase the salaries of state experts. Adequate funding for forensic science is critical to ensuring public confidence in the judicial system, the fairness of court decisions and the equality of all before the law. Effective work of forensic experts requires the existence of a special legal act that defines the procedure for obtaining the status of an expert, as well as the procedures for certification and advanced training. For example, in Latvia, forensic expert activity is regulated by the Law on Forensic Experts of the Republic of Latvia (2016) and Regulation of the Cabinet of Ministers of the Republic of Latvia No. 606 (2016). In the Czech Republic, the legislation was updated by Law of the Czech Republic No. 254 (2019).

The main legal act that regulates forensic expert activity in Ukraine, ensuring justice through independent, qualified and objective examinations, is Law of Ukraine No. 4038-XII (1994). This law had a significant positive impact on the development of forensic science, becoming the first document in independent Ukraine to consolidate the basic principles of expert activity. It defined important aspects, such as the legal status of a forensic expert, the basis of his or her activities, tasks, and principles of work. However, the law adopted in 1994 no longer met the modern requirements for the development of forensic practice. The identified shortcomings were related to the fact that the act mainly regulated

the procedural aspects of conducting examinations, leaving organisational and tactical issues unaddressed. The main problems that required legislative regulation were: the need to clarify the provisions of the law on the basis of forensic examinations; lack of time limits for the execution of examinations; lack of regulation of the review of expert opinions; uncertainty of the body responsible for state policy in the field of forensic science; inconsistency of the norms of by-laws with the norms of the law; the need for detailed legislative regulation of the activities of private expert institutions and experts. Based on the above analysis, it was found that Law of Ukraine No. 4038-XII (1994) required a substantial revision or even complete replacement with a new legislative act. This new law should clearly define the legal, organisational and financial basis of forensic science. The modern system of forensic expert activity had to be built and developed taking into account the needs of state authorities, judicial authorities and the public, which implied the creation of a unified legal framework for the regulation of expert activity.

The Law of Ukraine No. 4038-XII (1994) required a substantial revision due to changes in social relations and the development of the legal system. Since its adoption, many amendments and additions have been made to improve the regulation of forensic science. Thus, the legal, organisational and financial framework for the activities of forensic experts has been significantly updated and clarified, in particular:

- clarification of the status of experts, as amendments were made to the definition of the status of forensic experts, including the expansion of the circle of persons entitled to conduct forensic examinations, as well as clarification of their duties and responsibilities;
- organisational changes, as the latest version of the Law of Ukraine No. 4038-XII (1994) provides for clearer provisions on the organisation of forensic activities, including the establishment of new bodies responsible for the control and regulation of forensic experts;
- financial support, as provisions have been introduced to regulate the financing of forensic activities, including new funding mechanisms to ensure the independence and effectiveness of examinations;
- introduction of new standards and methodologies.

The new version pays more attention to standardization and implementation of modern methods of conducting examinations that meet international standards. Accordingly, in the current, final version of Law of Ukraine No. 4038-XII (2023), the legal provisions governing forensic science in Ukraine have been updated compared to the first version of the law (Law of Ukraine No. 4038-XII, 1994), which in many aspects no longer met modern requirements and challenges. The experience of European countries demonstrates the organisation of forensic activities within a particular agency (Ministry of Internal Affairs, Ministry of Defence, Ministry of Justice and others) as a part of it, vested with certain powers and functions. This practice of organising forensic activities within a particular agency may be useful for implementation in Ukraine. Therefore, it is advisable to create a separate and single body – the National Forensic Science Service, subordinated to the Ministry of Justice. Having a special body for this purpose would allow for effective analysis and comparison of data on the qualifications of forensic experts, assessment of the needs of expert institutions for new specialists, as well as the number of trained experts in public and private educational institutions.

A comparative analysis of the models of organisation of forensic activities shows that each of them has its advantages and disadvantages. It should be understood that in the countries under consideration there are a number of challenges related to the organisation of the effective functioning of expert activity. These problems cover both departmental expert institutions and non-departmental organisations that carry out expert activities outside forensic structures. Among the main issues, it is worth highlighting the problems of training and professional development of experts, including issues related to educational systems and training standards, as well as regulatory issues covering organisational and ethical aspects, the role of heads of expert institutions and the range of persons authorized to order examinations; financial issues, such as the formation of the cost of expert services and the lack of regulation for private experts; and issues of control over the performance of expert activities. In this context, it is important to take into account the specifics of Ukraine's national legal system, the level of development of forensic science and the needs of the state. For example, Ukraine needs to find a balance between centralised control and the autonomy of local and private expert institutions to ensure both high-quality expertise and promptness in conducting it. Therefore, Optimisation of forensic activities in wartime requires a comprehensive approach and coordination of efforts by government agencies, scientific institutions, international organisations and the public, as only close cooperation can ensure the effective functioning of the forensic system and the preservation of scientific and technical potential.

Discussion

The study of the models of organisation of forensic activities in the world practice allows for a better understanding of different approaches to ensuring the effectiveness of expert work, which is important for improving the forensic system in Ukraine and other countries. The analysis of different models of organising forensic activities reveals both effective and problematic aspects of different systems, which in turn helps to develop recommendations for improving existing practices. In particular, the results of the study confirm the importance of integrating elements of centralised and decentralised models to ensure high quality expertise and adaptability of the system to specific conditions. This is consistent with the findings of other researchers. For example, S. Bitzer *et al.* (2021), N. Sunde and G. Horsman (2021) point out that forensic examination is a key element for establishing the truth in criminal proceedings, but the qualifications of an expert alone do not always guarantee the quality of expert research. As mentioned above, improving the quality of expertise not only through the qualification of experts, but also through the Optimisation of organisational models can significantly affect the effectiveness of expert activity.

According to S. Doyle (2019) and V.R. Kebande *et al.* (2021), it is necessary to adapt legislation to European standards in the context of protecting human rights and freedoms. The results of the study indicate that Ukraine should focus on the integration of European practices in the field of forensic science. A comparison with the models used in the UK shows that hybrid approaches that combine centralised, and decentralised elements can provide the best results. This approach allows for effective coordination of experts, high-quality expertise, and quick response to specific requests

arising in different regions. Implementation of a similar hybrid model in Ukraine could improve coordination between public and private expert institutions, increase the level of professional training of experts and ensure a more flexible and efficient management of the forensic science system.

The review of the organisational aspects of the functioning of forensic institutions in European countries indicates the need to harmonize principles and practices to increase the effectiveness of the fight against transnational crime and improve the processes of investigation and detection of crimes (Chornous & Dul'skyi, 2024). It is important to establish common organisational principles and operational approaches among European law enforcement agencies to achieve these goals. This position is supported by research findings, in particular, in the works of S. Weyermann and C. Roux (2021), N.V. Passalacqua *et al.* (2021), who note that models of law enforcement systems are shaped by multiple factors that are specific to the historical and cultural conditions of particular countries. This means that, while there are general principles of organisation and functioning, each model has its own unique advantages and disadvantages.

Researches by K. Górka and M. Mazur (2021), A. Olckers and Z. Hammatt (2021) confirm the importance of the theoretical foundations of forensic science and methodological approaches to conducting examinations and note the importance of introducing international standards in the field of human rights and freedoms. Obviously, the development of a model of forensic expert activity should be based on a comprehensive analysis of historical experience and a comprehensive approach to combating crime. The existence of registers and the procedure for registering persons engaged in forensic science activities indicate their professional level and qualifications (Buribayev *et al.*, 2020). It also reflects the level of trust in the system and its effectiveness in ensuring high standards of expert activity.

As noted earlier, official registers of experts should serve as databases containing information about specialists in specific fields, and inclusion in such registers should be a confirmation of high standards of their work. However, according to scientific research, in particular, in the works of J. Fraser (2020) and T.E. Gross *et al.* (2021), there are serious questions about the effectiveness of these registers. It is noted that deficiencies in expertise are one of the main sources of miscarriages of justice, which complicates the establishment of the truth in criminal proceedings. As noted by I. Zieniewicz (2021), the existence of official lists of forensic experts does not always guarantee their real competence. Many candidates seeking to be included in such lists may use political influence or other extra-legal means that are not related to their professional achievements and qualifications. The findings of this study confirm these conclusions, pointing to numerous cases where formal registration procedures do not ensure an adequate level of expert competence. In particular, it was found that in some cases, the qualification requirements for experts are not sufficiently clear or are not properly enforced. This can have a negative impact on the quality of forensic examinations and the administration of justice in general. Therefore, a number of measures should be taken to improve the quality of forensic expertise: improve the procedures for inclusion in the registers, establish clear criteria for assessing the competence of experts and introduce effective mechanisms to monitor compliance with these criteria. In addition, it is necessary to ensure transparency

of the registration process and reduce the possibility of influence from political and other external factors (Dmytrenko, 2024). Thus, ensuring the reliability of official registers of experts is critical to improving the quality of forensic science. In view of the identified shortcomings, it is necessary to focus on improving the system of expert qualification and introducing stricter control mechanisms. This will reduce the likelihood of miscarriages of justice and ensure a more efficient functioning of the justice system.

Taking into account historical contexts and international experience, scholars and practitioners, in particular S. Jhalani *et al.* (2024), identify several approaches to reforming forensic science:

- maintaining the traditional model, which involves minor adjustments and decentralization of management functions;
- updating the traditional model by expanding the possibilities for creating expert institutions under sectoral central authorities;
- radical reforms with the creation of a single central body;
- a mixed model that combines elements of traditional and radical models;
- competitive model, which provides for the subordination of expert institutions to pre-trial investigation bodies to meet the specific needs of the investigation.

In the context of the modern development of science and technology, the institute of forensic examination is expanding and improving, creating a new institutional and organisational structure that integrates the latest achievements. Modern innovations such as digital forensic photography, 3D modelling, artificial intelligence and new diagnostic tools are becoming an integral part of expert research, opening up new opportunities for the accuracy and efficiency of forensic examination (Adanbekova *et al.*, 2022b).

Exploring related issues, Y.S. Sulley (2023) and V. Abrol (2024) point out the importance of taking into account the positive experience of other countries when organising forensic activities, without neglecting the achievements of national systems (in particular, the material, methodological and professional capabilities of departmental specialised expert institutions). This position is supported by studies that emphasize the importance of ensuring maximum independence and impartiality of forensic examinations. At the same time, some scholars, in particular S. Prahladh and J. van Wyk (2022), J.S. Allwood *et al.* (2020), believe that the departmental affiliation of experts should not affect their impartiality, especially in administrative proceedings.

Thus, the results of the study confirm that for the effective organisation of forensic activities, it is necessary to consider both the advantages of centralised models and the flexibility of decentralised systems. The recommendations arising from the study point to the need to create an adaptive system that can integrate best practices from international experience, considering the specific conditions of Ukraine.

Conclusions

The study showed that centralised models, which involve the management of forensic science through one central body, provide for more stable and standardised practice. At the same time, decentralised models, where different bodies or institutions have their own role in expert activities, allow for

a more flexible response to the specific needs of regions or oblasts. The organisation of forensic activities in European countries is focused on creating an effective system of expert institutions and ensuring optimal conditions for conducting examinations by qualified specialists who are appropriately accredited and included in the official registers of forensic experts. A single regulatory act or set of rules for conducting forensic examinations helps to unify approaches and improve the quality of expert opinions. Models for organising forensic activities in some countries, such as France, demonstrate the successful use of expert prognostication for crime prevention. This includes the development of preventive measures and recommendations for public authorities, which contributes to a more proactive approach to crime prevention.

The integration of the latest technologies and methodologies into the field of forensic science has become a decisive factor for countries with a developed forensic system. Modern technologies help to improve the accuracy and efficiency of expertise and make it accessible to a wider range of users. International experience confirms the importance of choosing an organisational model of forensic science that meets the specific requirements and conditions of each country. Adaptation of successful practices and implementation of advanced models can significantly increase the efficiency of expert activity and ensure the improvement of the quality of justice. The results of the study confirm the expediency of combining different models to improve the organisation of forensic activities. Such an approach allows for the integration of best practices, compliance with international standards and consideration of national peculiarities. This study is a significant step towards the development of recommendations for optimising the organisational structure of forensic science in Ukraine.

It may not be possible to study all possible models of forensic science organisation on a global scale in a single study due to its complexity and scope, which may lead to the omission of important aspects. For example, the study of forensic organisation models is limited to a few countries or regions, which may not fully reflect global trends and diversity of practices. As a result, some aspects may not be presented or sufficiently explored. Similarly, socio-cultural differences between countries may affect the organisation of forensic science activities, but are not always taken into account in the study. This can limit the understanding of specific contexts and model adaptations. Optimisation of forensic activities during martial law requires a comprehensive approach and coordination between government agencies, scientific institutions, international organisations and the public. Only through close cooperation can the effective functioning of the forensic system be ensured and the scientific and technical potential preserved.

Further research could focus on the impact of legal reforms, the introduction of new technologies such as artificial intelligence and 3D modelling, and their impact on the effectiveness of forensic institutions in different countries.

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Порівняльний аналіз моделей організації судово-експертної діяльності: світовий досвід

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Анотація. Метою дослідження була ідентифікація основних моделей організації судово-експертної системи в Україні та оцінка міжнародного досвіду в сфері експертного забезпечення правосуддя, а також аналіз шляхів адаптації сучасних світових стандартів до національної експертної практики. Теоретичною базою дослідження стали документи, які визначають статус та організацію судових експертів в Україні, Латвії та Чехії. Було проаналізовано функції, пов'язані з проведенням судових експертиз, огляданням і вилученням. Виявлено, що організація судово-експертної діяльності в європейських країнах орієнтована на створення ефективної системи експертних установ і забезпечення оптимальних умов для проведення експертиз кваліфікованими фахівцями, які мають відповідну акредитацію і включені до офіційних реєстрів судових експертів. Акцентовано, що в Україні спостерігається змішування двох підходів у структуризації судово-експертної діяльності. Переваги такої змішаної моделі включають гармонізацію судових експертиз, стандартизацію експертних методик, акредитацію криміналістичних лабораторій і публічність реєстру судових експертів. Обґрунтовано необхідність інтеграції української системи експертного забезпечення правосуддя в міжнародний контекст та участь українських судово-експертних установ у міжнародних організаціях, що об'єднують зарубіжні експертні інституції. Це сприятиме вдосконаленню процедур участі судових експертів у правосудді. Запропоновано створення єдиного органу – Національної служби з забезпечення судово-експертної діяльності, що підпорядковуватиметься Міністерству юстиції України. Практичне значення дослідження, таким чином, полягають в тому, що його результати можуть бути використані для централізованого вирішення проблеми методичного та інформаційного забезпечення експертної діяльності, що в свою чергу, покращить організацію судово-експертної діяльності в Україні

Ключові слова: судова експертиза; експертне забезпечення правосуддя; спеціальні знання; експертологія; міжнародний досвід