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Innovative technologies as alternative means of improving the efficiency of criminal justice in Ukraine

Інноваційні технології як альтернативні засоби підвищення ефективності кримінального судочинства України

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Written by:

Vlada Husieva¹¹⁹<https://orcid.org/0000-0001-8614-1573>**Oleksandr Avdieiev**¹²⁰<https://orcid.org/0000-0003-4203-8165>**Volodymyr Kornienko**¹²¹<https://orcid.org/0000-0001-7338-0794>**Larysa Kryvoruchko**¹²²<https://orcid.org/0000-0001-6635-2381>

Abstract

The purpose of the article is to study investigative and judicial practice, as well as international experience to determine the prospects for the introduction of innovative technologies in criminal justice in Ukraine in modern conditions, to reveal their capabilities in the context of improving investigative (investigative) actions and trials.

In order to achieve the goal of the article, a comparative legal method was used, which allowed to determine the internationally tested innovative methods of improving criminal justice. Methods of analysis and generalization have helped to identify current problems that arise in investigative and judicial practice, which can be solved through the introduction of modern forensic tools.

In the article, the authors argued that an alternative way to increase the efficiency of criminal justice in Ukraine is the introduction of innovative technologies that have been tested in some countries. Forensic innovations, the need for which is urgent now and the implementation of which is justified by the needs of investigative and judicial bodies of Ukraine, we include those aimed at automation, digitalization of pre-trial

Анотація

Метою дослідження є вивчення слідчої та судової практики, а також міжнародного досвіду задля визначення перспектив запровадження інноваційних технологій у кримінальне судочинство України за сучасних умов, розкриття їх можливостей у контексті підвищення ефективності слідчих (розшукових) дій та судових розглядів.

Задля досягнення мети статті використовувався порівняльно-правовий метод, який дозволив визначити міжнародні апробовані інноваційні методи удосконалення кримінального судочинства. Методи аналізу та узагальнення сприяли визначенню сучасних проблем слідчої та судової практики, які можна вирішити шляхом запровадження сучасних техніко-криміналістичних засобів.

Авторами доведено, що альтернативним шляхом підвищення ефективності кримінального судочинства України наразі є запровадження інноваційних технологій, які були апробовані в деяких державах. До криміналістичних інновацій, потреба у яких є нагальною наразі та запровадження яких обґрунтоване потребами слідчих і судових органів України, ми відносимо ті, що

¹¹⁹ Professor of the Department of Criminalistics, Forensic Science and Pre-medical care of Kharkiv National University of Internal Affairs, Professor, Doctor of Law, Kharkiv, Ukraine.

¹²⁰ Associate Professor of the Department of Police Activity and Public Administration of Kharkiv National University of Internal Affairs, Candidate of Juridical Science, Kharkiv, Ukraine.

¹²¹ Associate Professor of the Department of Police Activity and Public Administration of Kharkiv National University of Internal Affairs, Senior Researcher, Candidate of Juridical Science, Kharkiv, Ukraine.

¹²² Leading Researcher of the Department of Scientific and Legal Expertise and Draft Law of the Scientific Institute of Public Law, Doctor of Law, Kyiv, Ukraine.



investigation and trial. Prospects for the introduction of an electronic system of expert opinions, artificial intelligence technologies, laser three-dimensional scanning are identified. The need to improve the electronic justice system was emphasized.

Keywords: criminal proceedings, innovative technologies, database, electronic document management, lighting, 3D scanners.

Introduction

The processes taking place in society have an impact on all spheres of human life. The field of criminal justice is no exception, so the task of ensuring human rights and freedoms is becoming increasingly important. One way to achieve this goal is to administer highly effective justice.

Ensuring a highly efficient judiciary involves its implementation in accordance with the general principles of proceedings and international standards. Under such conditions, it creates harmonious preconditions for the systematic development of other spheres of society. Scholars have repeatedly stated that the timeliness and efficiency of litigation reduces the risk of default, protects the labor market (Antonucci, Crocetta & d'Ovidio, 2014; Zhu, Peng & Zhang, 2020), due to the amount of corporate money in bank accounts (Shah & Shah, 2016) and others.

The very process of ensuring highly effective justice is due to many factors and is not without its debatable aspects and problematic issues, which have been exacerbated by the pandemic of the COVID-19 virus and the military aggression of the Russian Federation. Our attention is drawn to those problems that have a legal nature and have led to a decrease in the efficiency of criminal justice in Ukraine.

According to the results of the analysis of investigative and judicial practice, the survey of respondents, we conclude that the main problems that emerged on the eve of the pandemic of the COVID-19 virus and are currently relevant, are staffing problems. These problems became especially acute after February 24, 2022, because since then a large number of settlements have become occupied, and some are under constant fire. Due to the real threat to life and health of citizens, some law enforcement and judicial authorities were unable to continue to operate

спрямовані на автоматизацію, цифровізацію досудового розслідування та судового розгляду. Визначено перспективи впровадження електронної системи експертних висновків, технологій штучного інтелекту, лазерного тривимірного сканування. Наголошено на необхідності удосконалення системи електронного судочинства.

Ключові слова: кримінальне судочинство, інноваційні технології, база даних, електронний документообіг, засоби освітлення, 3-D сканери.

and were evacuated to other settlements. Thus, the problems of staffing have manifested themselves in increasing the burden on employees of certain bodies and institutions, as well as the need to solve additional tasks, as well as existing but new conditions.

At the same time, the problems that have always existed in the practice of the investigation, prosecutor's office and court have become relevant. According to our survey of investigators and prosecutors, the use of data banks is almost impossible (96% of respondents indicated this), the search for persons involved in crimes and criminal offenses (93%) has become more difficult, the burden on law enforcement officers has increased. due to the need to solve additional tasks (71%), it became more difficult to find witnesses and call them to participate in investigative (investigative) actions, preparation for certain investigative (investigative) actions became overloaded (69%), decreased efficiency of pre-trial investigation and inquiry Insufficient material and technical support (67%), in the conditions of constant shelling and air threats, the efficiency of conducting certain investigative (search) actions, in particular inspections (43%), etc., decreased.

The interaction between investigative bodies and employees of expert institutions, in particular forensic bureaus, as well as court staff, defenders, probation representatives and penitentiaries, etc., has become more complicated. Some expert institutions have virtually ceased to perform their duties due to the evacuation of special (unique) research equipment and personnel.

We believe that minimizing the negative impact of some of these factors is possible through the introduction of innovative technologies. In this regard, the purpose of our study is to study

investigative and judicial practice, as well as international experience to determine the prospects for the introduction of innovative technologies in criminal justice in Ukraine under modern conditions, their opportunities in the context of improving the effectiveness of investigative (investigative) actions and trials.

Methodology

In order to achieve the goal of the article, a comparative legal method was used, which allowed to determine the internationally tested innovative methods of improving criminal justice. Methods of analysis and generalization have helped to identify current problems that arise in investigative and judicial practice, which can be solved through the introduction of modern forensic tools. Logical methods have been used to identify the most effective state-of-the-art technologies that facilitate rapid and effective investigations and trials. Statistical methods, system analysis method, etc. were also used.

Literature Review

The innovative way of development of criminology is caused, first of all, by the newest scientific developments, creation and improvement of information technologies, introduction of high-tech equipment, scientific and technical means of new generation, computerization and automation of processes of investigation of criminal offenses and their trial. Such the latest scientific developments in the theory of criminology are called forensic innovations.

In a broad sense, forensic innovations are developed, implemented and applied in practice the latest technical, tactical, methodological and forensic tools, which are the result of research or development, embodied in the form of a new product (product), new technology, services, solutions that qualified special entities use in practice and aimed at effectively solving forensic problems, ensuring optimization, improving the quality and effectiveness of law enforcement practice and further innovative development of forensic science (Shevchuk, 2021, p. 13). Such forensic innovations include new, developed or adapted to the needs of investigative (judicial) practice, forensic tools, modern information technology, electronic knowledge bases, methods of recording, analysis and evaluation of evidence, and others (Bernaz, 2015).

Foreign and domestic scientists are constantly engaged in the development and implementation

of the latest technical and forensic tools in the field of criminal justice. In the context of such research, much attention is paid to modern computer, special and forensic technology. The technical and forensic tools that are in urgent need now include lighting tools, the prospects of which have long been studied by domestic scientists (Lozova, Kokorin & Lozovyi, 2021). Researchers also emphasize the important role of laser scanners, polygraphs, etc. in the investigation of criminal offenses (Baranchuk, 2020; Husieva, Oderiy, Petrova, Fomina, & Vuima, 2021). Domestic and foreign scientists are also actively studying the issues of using modern technical technologies in judicial proceedings. (Antonucci, Crocetta & d'Ovidio, 2014; Marycheva, Kucher, Kurylo, Demkiv & Grabar, 2021; Tymoshenko, Kozachenko, Kyslenko, Horodetska, Chubata, & Barhan, 2022) also point to the need to improve the technical and forensic support of courts. Scholars also emphasize the importance of resolving issues of rational distribution of the number of cases, which is a burden on one judge and other staffing issues of courts (Dimitrova-Grajzl, Grajzl, Sustersic & Zajc, 2012), etc.

Despite the significant achievements of scientists, we believe that in modern realities, the introduction of innovative forensic technologies needs a separate study, because a significant number of controversial issues need to be revised, and their number - reevaluation taking into account current law enforcement conditions. Based on the generalization of scientific developments, as well as the results of the analysis of empirical material, we consider it appropriate to identify the latest technical and forensic tools that need immediate implementation in the investigative bodies, prosecutors and courts of Ukraine. That is we propose to identify prospects for introducing innovative technologies in criminal justice in Ukraine as an alternative way to increase its efficiency.

Results and discussion

Innovative technologies in criminal justice ensure respect for human rights in investigative and procedural actions. They are also a means of implementing in practice such principles of criminal proceedings as access to justice, fair, impartial and independent court, reasonable time of trial (Khanyk-Pospolitak, 2017; Marycheva, Kucher, Kurylo, Demkiv and Grabar, 2021).

The introduction of innovative technologies in the activities of inquiry bodies, investigative

units, prosecutor's offices and courts of Ukraine is explained by the fact that in the case of their use it is possible to achieve a set of goals, in particular:

- increasing the effectiveness of forensic and expert research;
- development and application of new search and cognitive methods of investigative (investigative) and covert investigative (investigative) actions;
- introduction of the newest technical means of detection and research of traces of crimes and criminal offenses;
- increasing the professional training of investigators and operatives by forming new professional skills in them;
- timely provision of these entities with the necessary scientific, methodological and other supporting information (Husieva, 2021b).

Among the forensic innovations that are urgently needed and the implementation of which is justified by the needs of investigative and judicial bodies of Ukraine, we should single out those forensic innovations that are aimed at automation, digitalization of pre-trial investigation and trial, including automated systems and data banks.

In the study of data banks should pay close attention to those one of the managers of which are expert institutions. Such data banks are a tool for collecting, storing, analyzing and structuring information and using it to:

- accumulation and storage of information about forensic objects;
- optimization of examinations;
- storage of specialized literature and methodical recommendations;
- formation of archives, files, records;
- storage of expert opinions, as well as documentation related to forensic examinations;
- solving problems of expert forecasting and expert prevention;
- training of expert staff, improving skills in working with computer systems (Bondar, 2018, p. 135).

The current procedure for the operation of expert data banks needs to be reformatted, as it does not correspond to today's realities. For example, the Committee on Law Enforcement of the Verkhovna Rada of Ukraine has repeatedly raised the issue of adopting and approving the

draft law on the procedure for filling and maintaining DNA records, but it was not adopted due to lack of funds in the State Budget of Ukraine for further implementation of legislative initiatives. In addition, as scientists point out, the issue of the number of genetic laboratories, increasing the level of logistics of relevant institutions and organizations, as well as determining the institution that should be the administrator of accounting (Husieva, 2021a).

Regarding the register of weapons, the Regulation on the functional subsystem "Unified Register of Weapons" of the unified information system of the Ministry of Internal Affairs was approved only in January 2022. Among the main objectives of its creation were: identification of objects or explosives; automation of processes of information, reference, organizational and technological support in the field of circulation of objects and explosives, recording the facts of theft and loss of objects and explosives; ensuring by the state effective control in the field of circulation of objects and explosives, prevention of theft and loss of objects and explosives; promoting the timeliness of management decisions in the field of circulation of objects and explosives and on the facts of theft and loss of objects and explosives. The positive thing in this matter is that the subjects of the Unified Register of Weapons are: the Ministry of Internal Affairs of Ukraine; National Police of Ukraine; Main Service Center of the Ministry of Internal Affairs; Expert Service of the Ministry of Internal Affairs of Ukraine and others. As a result of hostilities on the territory of Ukraine, the register has not yet started functioning, but we believe that the adoption of this provision has become a fundamental step in resolving the issue of standardization of the Unified Register of Weapons, and an expanded list of actors institutions of the Ministry of Internal Affairs of Ukraine.

Assessing the international experience of expert data banks, it should be noted that it is more progressive than domestic. For example, in France, the Opalexe platform, created with the active participation of experts, lawyers and representatives of the justice system, is successfully used to digitize forensic expertise. The database is protected from possible attacks, from attempts to make changes to information, from access by third parties. To access the system you need to be authenticated, the expert must obtain a digital certificate. Through this platform there is an interaction between the court and the parties. Any information, starting from the decision on the appointment of the examination,

is sent to the system in pdf format, after which it can no longer be changed. According to the 2017 report, more than 63,000 documents were registered in the system (Brindeau, 2017).

The New York Police Department uses databases in forensic science to collect experimental data from various laboratory tests and research. For this purpose, use the laboratory information management system LIMS (Laboratory Information Management Systems), which contains a database of all conducted expert research (Orokos, Hicks, Lednev, Stevens, Strzalkowski & Goel, 2010).

Comparative legal analysis of domestic and international experience of expert data banks suggests that the provisions of national legislation need to be revised, as the current procedure of expert databases in Ukraine does not fully meet the needs of investigative and judicial bodies. A significant shortcoming in this direction is also the lack of a single electronic database of expert opinions. We believe that this issue needs to be addressed immediately, as it is one of the priorities, as the implementation of such a system has a number of advantages. First, it is an opportunity for automatic analysis of expert opinions by means of the system of electronic criminal proceedings. Secondly, the electronic form of the conclusion has a number of guarantees regarding the origin of the conclusion and its authenticity, which in turn is a reliable means of combating abuse and falsification in criminal proceedings. And thirdly, in this way it is possible to improve the process of exchange and storage of examination results, acquaintance of the defense with the examination results (Pavlova, Shevchenko, 2020). The difficulty of resolving these issues is due to the fact that state specialized expert institutions belong to the sphere of management of various ministries: Ministry of Justice of Ukraine, Ministry of Health of Ukraine, Ministry of Internal Affairs of Ukraine, Ministry of Defense of Ukraine, Security Service of Ukraine and State Border Guard Service of Ukraine. At the same time, even the introduction of such a system within the bodies of the Ministry of Internal Affairs of Ukraine is also not possible, as electronic document management is not established between the bodies of this ministry at the appropriate level. In this regard, these issues need further research and immediate action to implement them in practice, as they will help increase the efficiency of criminal justice in Ukraine.

We also include IT technologies among the innovative technologies that currently need to be introduced immediately in the field of criminal justice. In this context, we should mention the positions of scientists who have repeatedly pointed to the need to increase the number of investigators and provide opportunities for their retraining in the field of IT and others. (Bertovsky, Ryzhkova & Ryzhkov, 2021; Shevchuk 2021; Pavlyuk, Parasiuk, Dutko, Parasiuk & Stasiv, 2021). At the same time, it should be borne in mind that the use of certain technical and forensic tools should be regulated by law. The absence of such regulations makes it impossible to use the results of such studies as evidence (Mohilevskiy, Husieva, Perlin, Chycha & Shynkarenko, 2022).

The use of artificial intelligence technologies, which are already widely used in some countries in the legal field and legal practice in some countries, will help increase the efficiency of criminal justice (Kryvytskyi, 2021, p. 94). Artificial intelligence technologies allow to analyze various materials and offer solutions based on certain algorithms that do not require human control. That is, they help to ensure an autonomous search for solutions, including in legal matters (Vertinsky, 2017). For example, in early 2017, JPMorgan announced the use of Contract Intelligence software, which in a few seconds can analyze legal documents, which previously required 360 thousand working hours. Baker & Hostetler has announced that it is hiring ROSS artificial intelligence to file for bankruptcy, which previously had nearly 50 lawyers. Developed on IBM's Watson cognitive computer, ROSS artificial intelligence will monitor law and order around the clock, read and understand language, hypothesize, research and then generate answers with appropriate references and citations, learn from experience, and more. Researchers from the University College London and the University of Sheffield have created a "computer judge" that provides for 79% of European Court of Human Rights judgments (Radutnyi, 2018, p. 126; Radutnyi, 2019, p. 46). In Ukraine, artificial intelligence systems can be used when accepting applications for administrative or criminal offenses, consideration of materials of citizens' appeals in which there are no signs of criminal offenses. At the same time, developers should keep in mind the need for five ethical principles in the administration of justice, including: the principle of respect for fundamental human rights in the use of artificial intelligence, the principle of non-discrimination, namely preventing any discrimination between individuals or groups;

the principle of quality and safety, which applies to the processing of court decisions and data in a secure technological environment, the principle of "user control", the principle of transparency, impartiality and fairness.

Among the modern technical and forensic tools, the special need for which is currently felt, it is necessary to single out the technologies of laser three-dimensional (hereinafter - 3D) scanning. The use of laser scanning of terrain and objects, which results in a 3D model, allows to increase the informativeness of the data collected at the scene, provides a clear and convenient three-dimensional visualization and illustration.

The need for their widespread use in site inspections is due to the fact that currently, due to military aggression, investigators of the National Territorial Departments are entrusted with investigating inspections of damaged buildings, which are sometimes located in fairly large areas. Such examinations are difficult because they require close attention, a number of actions, sometimes in the presence of threats to life and health, the involvement of a number of specialists, and are quite long in time. That is, recording the course and results of the investigative action requires considerable effort, and the use of 3D scanners can simplify this process. The main advantages of using 3D scanners on the scene include: a) objectivity of reproduction of objects, due to high detail and fixation of geometric shapes (surfaces) without distortion, in contrast to serial or panoramic photography (Remondino, Guarnieri, Vettore, 2004); b) the speed of recording all traces and the situation at the scene (3D scanner performs millions of measurements per second with an accuracy of 1 mm); c) the accuracy of fixing the location of people and objects at different distances; d) the possibility of scanning in low light or in its absence, which is carried out using infrared rays (Baranchuk, 2020); e) multifunctionality of software that allows you to quickly create two-dimensional or three-dimensional schemes of the crime scene; use your own measurements from aerial photographs, drones, portable scanners or satellite maps; explore the field of view of each participant from any point at the scene; to carry out the analysis of movement of vehicles, their collision, to measure speed on traces of drift and braking, to define sizes of kinetic energy and inertia, to calculate a trajectory of flight of a sphere; recreate realistic virtual scenarios of the movement of participants (objects), as well as allows you to quickly view the three-dimensional model of the scene during the inspection or its

demonstration in court (FARO Laser Scanners); f) mobility, because due to their small size and convenient configuration they can be used and transported by one person; g) safety, scanning technology does not emit harmful radiation (Houpert, Rerolle, Telmon & Saint-Martin 2016, pp. 20-24).

In our opinion, the main disadvantage that significantly affects the possibility of using 3D scanners in Ukraine is the high cost of equipment and its adjustment compared to other means of fixation. However, it should be emphasized that the need for their use does not arise in any criminal proceedings, so first it would be enough to ensure their availability at least in mobile specialized laboratories established under the investigative departments of the Main Directorates of the National Police of Ukraine. At the same time, preference should be given to those departments that are located on the territory of administrative-territorial units where hostilities take place.

Information systems and technical means that ensure the functioning of electronic document management, electronic court systems, the Unified Register of Court Decisions, etc. play an important role in ensuring effective justice. Information systems and technical means that ensure the functioning of electronic document management, electronic judicial systems, the Unified Register of Court Decisions, etc. play an important role in ensuring effective justice. Currently, the use of the latest information technologies is more widespread in the judiciary. The e-court system allows the exchange of procedural documents in electronic form between courts and participants in court proceedings, in particular the defense and the prosecution. In the context of the pandemic and martial law in Ukraine, court hearings have become more common by videoconference. Among the positive benefits should be noted time savings, mobility of work with procedural documents, saving money, implementation of the principles of accessibility and openness of justice, etc. (Marycheva, Kucher, Kurylo, Demkiv, & Grabar, 2021).

The e-justice system in Ukraine needs to be improved, as it is still malfunctioning. Lawyers often complain that they do not have unimpeded access to the e-court system, as the server is often overloaded. In addition to these problems, the researchers also emphasize that the law does not provide for any liability for those who provide technical support to the E-Court. No person will be prosecuted for failure to submit a procedural

document to the court due to failures within the Electronic Court. Che leads to violation of procedural deadlines for the submission of procedural documents and, as a consequence, the need to renew it. So far, the e-court system is not filled with templates of all necessary documents (Verbitska, & Gogol, 2020; Zuryan, 2021). Login to this system is by means of a qualified electronic signature. At present, not all citizens have the opportunity and desire to obtain such a signature, so the question arises as to access to justice.

Among the positive examples of the functioning of the electronic justice system should be noted Germany. With the help of modern information technology and technical means, German litigants have the opportunity to submit documents and process them in electronic format. With the help of paid personal accounts, users can discuss with opponents in writing and file complaints about their documents (Frank, 2021). We see that these positive examples of the functioning of electronic justice should be implemented in Ukraine, because they will contribute to the implementation of the principles of justice, including the principles of criminal proceedings.

Conclusion

It should be note emphasized that an alternative way to increase the efficiency of Ukraine's criminal justice system is to introduce innovative technologies that have been tested by developed countries. Forensic innovations, the need for which is urgent now and the implementation of which is justified by the needs of investigative and judicial bodies of Ukraine, should include those aimed at automation, digitalization of pre-trial investigation and trial, including automated systems and data banks. In order to increase the activity of investigative bodies and expert institutions, it is expedient to introduce electronic criminal proceedings, the subsystems of which would include a functional part for the appointment of forensic examinations. Improving the efficiency of forensic expertise can be achieved by creating a single electronic system of expert opinions, a database of forensic objects, experimental data, expert opinions, expert opinions, etc. This is due to several circumstances, first, data banks are used not just as electronic archives of information, they are a way to improve expert practice, simplify the interaction between the various subjects of legal relations by introducing electronic document management. This approach allows to increase the professional competence of forensic experts,

which is possible due to the functioning of an open database of expert opinions, because under such conditions, experts have the opportunity to familiarize themselves with them and generalize expert practice.

Artificial intelligence technology needs to be implemented in the practice of investigative and judicial bodies, as such systems help solve problems through the use of certain algorithms. The end result of such actions is sound legal decisions. Given the shortage of staff, this would help reduce the burden on members of some of their bodies. In the context of the introduction of forensic tools, we have identified the technology of laser three-dimensional scanning. The use of laser scanning of terrain and objects, resulting in a 3D model, can increase the efficiency of site inspections, especially in combat, increase the informativeness of data collected at the scene, provide visual and convenient three-dimensional visualization and illustration.

The system of electronic court proceedings in Ukraine now allows for court hearings by videoconference, audio recording of court hearings, provides use of official Internet resources of courts, but is not without a number of difficulties. This is due to technical problems and underdevelopment of software and hardware components. Traditional "paper" justice does not yet enjoy a high level of trust among the population. At the same time, as some users point out, quite often the system of electronic litigation due to technical malfunctions for a long period of time ceases to operate, sometimes throughout Ukraine, and sometimes - in some regions. The possibilities of the e-litigation system do not allow to submit only a limited list of documents, and also do not have the possibility to correct and refine them. In this regard, it can be stated that it is necessary to study the international experience on this issue and the introduction of proven innovative forensic technologies in the field of criminal justice in Ukraine in order to increase its effectiveness.

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