

Forensic Examination in the Digital Age: Challenges, Innovations, and Prospects for Development

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Forensic examination is a key component in ensuring justice, facilitating the establishment of truth in criminal, civil, and administrative cases. However, with the development of information technologies and their penetration into all spheres of life, both the complexity of crimes and the requirements for investigative methods have increased. In these circumstances, digitalization, automation, and the implementation of cutting-edge technologies are becoming the foundation of modern forensic science.

The digitalization of society has given rise to new forms of crime, such as cybercrimes, financial fraud involving cryptocurrencies, falsification of digital documents, dissemination of malicious software, and other offenses that require specialized knowledge for investigation.

Most of these crimes have a transnational character, complicating their identification and documentation. Cybercrimes involve technologies that conceal evidence, such as encryption, anonymous networks, and manipulation of digital proof. This necessitates forensic experts to have a profound understanding of contemporary technologies and the expertise to analyze them.

Additionally, digital transformation has posed challenges for traditional forensic practices. For instance, experts working with physical evidence increasingly face tasks involving the verification of digital forms of such evidence (photographs, video recordings, electronic documents). In the context of globalization and rising crime rates, the standardization of forensic methods at the

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international level has become a pressing issue.

In response to modern challenges, innovative technologies are actively being introduced, transforming approaches to the collection, analysis, and evaluation of evidence.

The National Scientific Center “Hon. Prof. M. S. Bokarius Forensic Science Institute” of the Ministry of Justice of Ukraine is at the forefront of digital transformation, integrating advanced technologies into its operations. The Center implements scientific research projects aimed at adapting international standards to Ukraine’s forensic practice and collaborates with leading forensic institutions worldwide.

As of today, the journal “*Theory and Practice of Forensic Science and Criminalistics*” is indexed in the following scholarly databases: Google Scholar, Academic Scientific Journals Indexing, Bielefeld Academic Search Engine (BASE), CORE, Crossref, Directory of Open Access Journals (DOAJ), Directory of Open Access Scholarly Resources (ROAD), Central and Eastern European Online Library (CEEOL), ERIH PLUS, Eurasian Scientific Journal Index (ESJI), Europub, Index Copernicus International, MIAR, RefSeek, ResearchBib, Ulrich’s, WorldCat, and the Register of Scientific Publications of Ukraine. The journal’s electronic versions are available online on sites such as the V. I. Vernadsky National Library of Ukraine, libraries of forensic institutions under the Ministry of Justice of Ukraine, institutions of higher education under the Ministry of Internal Affairs of Ukraine, and others. This facilitates the exchange of scientific developments between the journal’s authors and researchers worldwide.

As in previous issues, the academic papers in this volume of «*Theory and Practice of Forensic Science and Criminalistics*» are divided into two categories: *Research Papers* and *Case Notes*.

Let us briefly review the contents of the current issue. The paper “*Modern Interaction of Forensic Experts, Criminalists, and Journalists: Challenges and Prospects*” by Doctor of Law and Professor **Olesya Vashchuk** (Ukraine) focuses on analyzing modern challenges, particularly the rise of cybercrime and the use of innovative technologies by criminals, which complicates investigations and requires new approaches and legal mechanisms to ensure the accuracy and impartiality of journalistic materials. The study adopts an interdisciplinary approach by analyzing legal, ethical, and technological aspects of collaboration between journalists, forensic examiners, and criminalists.

Ph. D. in Economics, **Valeriia Bondarenko-Berehovych** (Ukraine), in her paper “*Strategies for Minimizing Errors in Forensic Expert Practice*”, investigates ways to minimize errors in forensic practice, including the influence of cognitive biases, the role of modern technologies, improvements in training and certification systems for experts, and ethical aspects of forensic work. She formulates key strategies for error minimization in forensic practice, which carry significant theoretical and practical value. As a result of the study, a comprehensive approach to minimizing errors is developed, integrating various aspects of the problem to provide a holistic solution. Emphasis is placed on cognitive biases, insufficient expert training, and the lack of unified standards. The impact of modern technologies on reducing the number of errors is assessed, and recommendations are proposed for improving the system of training and certifying forensic experts.

Doctor of Veterinary Sciences, Professor **Ivan Yatsenko** (Ukraine), in his research “*Substantiation of Issues in the Procedural Document on the Appointment of a Multidisciplinary Forensic Examination Concerning Animal Poisoning*”, focuses on identifying dis-

tinguishing signs and physiological features of living animals (or animal carcasses), detecting poisons, determining the pathways and methods of toxin entry into the animal's body, understanding the mechanism of the poison's action, and assessing the degree of health impairment or loss of usability of the animal due to poisoning. The study also establishes causality between the poisoning and the health disorder (or death) of the animal, as well as determining whether physical pain and suffering were inflicted on the animal prior to death. The practical significance of the research lies in logically systematizing and scientifically formulating questions that pre-trial investigation bodies or courts can include in procedural documents for appointing comprehensive forensic examinations, thus enabling forensic scientists to provide the most complete and substantiated conclusions within the optimal time frame.

Candidate of Philological Sciences, Associate Professor **Nelia Medvid** (Ukraine), in the manuscript "*Combinations of philological knowledge application while forensic linguistic (semantic and textual) examination*", highlights the need for new scientific developments in the field of semantic-textual examination, driven by current political and social demands. She notes the complexity of linguistic examiners' work due to the lack of methodologies for conducting such research. The study explores potential applications of philological knowledge when analyzing texts containing elements of incitement, intimidation, propaganda, or the pursuit of unjustified benefits.

Recommendations are outlined for analyzing texts using elements of semiotic, linguo-pragmatic, semantic, stylistic, thematic, formal-grammatical, descriptive, interpretive analysis, intent analysis, and knowledge from cognitive linguistics. An example is provided from the author's own practice involving the analysis of a con-

flict-related text in a case concerning the protection of an individual's honor, dignity, and business reputation, as well as socio-political texts. Forensic research algorithms for media-related texts and calls to action are presented. Theoretical aspects and methodological recommendations are highlighted for identifying key indicators of incitement to suicide at psychological, verbal, and non-verbal levels. It is proven that semantic-textual analysis requires profound expertise in linguistics.

In the following joint academic article, "*The Importance of the Bokarius Family in the Development of Forensic Medicine in Ukraine (A Review Article)*", Associate Professors **Zhanneta Pertseva** (Ukraine) and **Olha Vynohradova** (Ukraine) emphasize the role of the Bokarius family in the advancement of forensic medicine and criminalistics in Ukraine. The scientific contributions of three family members are presented: the father, Mykola Serhiiiovych, and his sons Mykola Mykolaiovych and Vitalii Mykolaiovych. General scientific methods such as description, comparison, analysis, and synthesis are applied to achieve the study's goal.

The Bokarius family dedicated over 100 years of professional life to forensic medicine and criminalistics. Mykola Serhiiiovych Bokarius, known as a knowledgeable scholar and talented educator, is regarded as the founder of the criminalistics direction in Ukrainian forensic medicine. He made significant contributions to the formation of the national forensic examination system and forensic institutions, including the establishment of the Forensic Science Office in Kharkiv.

His eldest son, Mykola Mykolaiovych, continued his father's scientific, forensic, and teaching activities. He headed the Kharkiv Institute of Forensic Examinations for 25 years and significantly contributed to training personnel in Kharkiv's medical

and legal institutes, founding the department of criminalistics at the latter.

The younger son of Mykola Serhiiovych, Vitalii, was deeply impacted by the war. After graduating from the Kharkiv Medical Institute, he went to the front. Unfortunately, no printed records of him have been preserved; the authors relied on the memories of his son, military doctor Serhii Vitaliiiovych.

Ph.D., Associate Professor **Karen Mamikonyan** (Armenia) and **Anush Harutyunyan** (Armenia), in their scientific article *“On the Issue of Exempting Dividends Received from the Participation of Individuals in Company Capital from Taxation”* examine the economic consequences arising from disproportionate double taxation of corporate profits under legal regulation. These consequences are related to investment transparency, risk factors in encouraging investment, and particularly the accumulation of unjustified capital reflected in companies' financial statements. This is especially relevant in cases where limited alternative investment opportunities lead to profit distribution (dividend payments) and reinvestment into authorized capital without proper documentation, as stipulated by legal acts.

Tax avoidance (or withholding tax) on dividends paid to individuals participating in a company's capital may constitute grounds for legal violations. This could result in financial-economic forensic examinations in criminal or court proceedings through specific questions posed to forensic examiners. Meanwhile, the article suggests that corporate and individual accountability under current legal norms is unjust, considering flaws in tax policy and the existing legislative framework. Discussions on methodologies for addressing this issue in financial-economic forensic research are relevant today, as effective and targeted reinvestment of capital directly

impacts a company's ability to meet obligations, maintain financial stability, and protect shareholders' interests while pursuing future developmental goals. Scientific methods such as analysis, synthesis, generalization, and logical-structural approaches were applied.

The research section concludes with the article by Candidate of Economic Sciences, Associate Professor **Olha Dyvnych** (Ukraine) and **Anatolii Dyvnych** (Ukraine), *“Prospects for Determining the Market Value of Combat Small Arms Based on the Data of Purchase and Sale Agreements in Ukraine”*. The authors propose determining the value of firearms (a task complicated by a lack of information and legal ambiguity surrounding the market's operation) by analyzing transactions completed through public procurement procedures for pistols. General scientific and specialized methods were applied. It is proven that a market for military small arms exists in Ukraine. The authors identify market participants and characterize the mixed structure of imperfect competition. Furthermore, similarities between the Ukrainian small arms market and analogous markets in developed countries are highlighted.

The notes section opens with **Daria Barbash** (Ukraine) material *“Legal Principles of Justice Administration: European Union Experience and Implementation in Ukrainian Legislation”*. The article provides a systematic analysis of current legislation and case law in the European Union and Ukraine, highlighting the principles of justice and the courts' relevant legal positions regarding their application and protection. The author emphasizes the close correlation between individual principles of justice within their system and proposes examining them comprehensively in interconnected groups. The conclusion is drawn that Ukraine's current legislation contains a unified system of fundamental princi-

ples of justice, aligned with European standards, while national judicial practice ensures compliance, incorporating European case law.

Teodore Giorgobiani (Lithuania), in his article “*Economic and Social Drivers of Cybercrime*” explores how modern global realities—characterized by technological progress and heavy reliance on digital tools—exacerbate cybercrime. He highlights the threats posed by cybercrime and analyzes its prevalence across 94 countries, examining the influence of six predictor variables. His analysis reveals an inverse relationship between economic freedom and cybercrime rates, while innovation, though a contributing factor, increases cybercrime at a lower rate.

Samir Ilyas oghlu Gadirov (Azerbaijan), in “*Modern problems of criminal law fight against hooliganism*” examines the multifaceted nature of hooliganism as an illegal phenomenon. Tracing its historical development from its origins to the present day, he explores the challenges it presents to modern society and the factors driving its spread. He considers both legislative and social dimensions, investigating the social, cultural, and economic shifts that give rise to and perpetuate hooliganism in many countries.

The final article in this issue, “*Improved Incendiary Device: Concept Definition*” by **Mykhailo Kuzmenko** (Ukraine), focuses on defining the term “homemade incendiary device” for use in forensic fire investigations. Employing system-structural analysis, Kuzmenko addresses the lack of established methodologies for studying these devices. This absence hinders foren-

sic fire examiners in identifying the precise ignition source responsible for igniting materials or substances, or for generating sufficient energy to ignite the flammable environment at the fire’s origin.

The final pages of the 37th issue of the edited volume “*Theory and Practice of Forensic Science and Criminalistics*” highlight significant recent developments in the field. Despite the ongoing Russian military aggression against Ukraine, the editorial board emphasizes the active participation of staff from the National Scientific Center “Hon. Prof. M. S. Bokarius Forensic Science Institute” in international and Ukrainian events. These high-level scientific gatherings demonstrate the resilience of Ukrainian scientists and specialists working under the challenging conditions of martial law.

The editorial board expresses its sincere gratitude to all contributing authors and the staff involved in preparing this issue for publication. Your innovative ideas and scientific contributions enrich our publication and underscore its importance within the professional community.

We cordially invite Ukrainian and international scientists and practitioners—including forensic scientists, academics, law enforcement agencies, courts, and other institutions—to submit their research paper to our journal.

Fruitful collaboration between authors and the editorial board is essential to the continued success of *Theory and Practice of Forensic Science and Criminalistics*. Together, we strive to advance science, even in the most trying of times.

Together we head to the Victory!
Glory to Ukraine!