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## **Abstract**

This article studies the modern framework of the digital economy and the characteristic features of crime investigation in terms of the widespread implementation of digital technologies. Recently, there is the emergence of electronic documents and e-signature as new objects that may carry forensic information. Therefore, there is the issue of detection and fixation of digital footprints. We highlight the importance of continuous communication with specialists in Information Technology during the preliminary investigation of crimes committed in the economic sphere.

## **Keywords**

Digital economy – Electronic document – e-signature – Digital footprints



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## Introduction

The notion of the digital economy has been formulated recently. It is defined as the system of economic relationships with electronic data being the main factor in all spheres of economic and financial activity. In advanced economies, digital technologies are considered to be the principal indicator of modern economic relations, especially at the international level. Currently, there is The Digital Single Market in the European Union which is mentioned in documents such as Digital Agenda for Europe 2015 and The Innovation Union. Studying law in the digital economy, Bykov<sup>1</sup> highlights that the UK adopted the Digital Economy Act which focuses on improving national cybersecurity.

To enter the European and global economic arena, the Russian Federation should have a highly-developed technological sphere for economic activity<sup>2</sup>. However, developing a social and technical environment considers the use of digital technologies<sup>3</sup>. In many countries, developing the high-tech sector of the economy is one of the main perspectives for eliminating criminal threats<sup>4</sup>.

According to Tribushnaya and Tribushnaya<sup>5</sup>, the analysis of different sources we can define several directions for the development of the digital economy as follows: legal, informational and technological, and staffing. Kluchevskaya highlights the role of digital technologies in the media sphere<sup>6</sup>. Kamalova and Chernetsova conducted a research on the issues of the definition and classification of electronic documents<sup>7</sup>. Pushkarev considers carding to function as the basis of crimes in the economic spheres<sup>8</sup>.

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<sup>1</sup> A. Ju. Bykov, *Pravo tsyfrovoy ekonomiki: nekotorye narodno-khozyaystvennyye i politicheskiye riski* (The Law in Digital Economy: National, Economic, and Political Risks) (Moscow: Prospekt, 2018), 10

<sup>2</sup> The Order of the Government of the Russian Federation No. 1632-p "On Approving the Programme "Digital Economy in the Russian Federation"". July 28, 2017.

<sup>3</sup> D. A. Ivanov; A. S. Esina; P. V. Fadeev; O. G. Chasovnikova y E. A. Zorina, "Crime Victim Compensation", *Gênero e Direito* Vol: 9 num 4 (2020): 753-758 y D. A. Ivanov y M. A. Kruglikov, "Mezhdunarodnyye standarty mer presecheniya i ikh implementatsiya v zakonodatel'stvo Rossiyskoy Federatsii", *Vserossiyskiy kriminologicheskiy zhurnal* Vol: 14 num 4 (2020): 623-630.

<sup>4</sup> V. V. Pushkarev; A. Gaevoy; A. V. Skachko; A. Kolchurin y D. N. Lozovsky, "Criminal Prosecution and Qualification of Cybercrime in the Digital Economy", *Journal of Advanced Research in Dynamical and Control Systems* Vol: 11 num 8 (2019): 2563 2566 y V. V. Pushkarev; P. V. Fadeev; S. A. Khmelev; Nguyen Van Tien; E. A. Trishkina y A. A. Tsviliy-Buklanova, "Crimes in the Military-Industrial Complex (MIC)", *International Journal of Recent Technology and Engineering (IJRTE)* Vol: 8 num 3 (2019): 7950 7952.

<sup>5</sup> V. Kh. Tribushnaya y M. I. Tribushnaya, "Kluchevye aspekty rossiyskoy tsifrovoy ekonomiki i normativnogo regulirovaniya", *Innovatsionnaya Ekonomika: perspektivy razvitiya i sovershenstvovaniya* Vol: 8 num 34 (2018): 335-340.

<sup>6</sup> I. S. Kluchevskaya, *K Voprosu o Roli Tsifrovyykh Tekhnologiy v Pechatnykh Media* (On the Issue of Digital Technologies in Printed Media), in: *Tendentsii i perspektivy razvitiya sotsiotekhnicheskoy sredy: materialy III mezhdunarodnoy nauchno-prakticheskoy konferentsii*. (Moscow: SGU, 2017), 338-339.

<sup>7</sup> G. G. Kamalova y E. N. Chernetsova, "Informatsionno-pravovyye i Kriminalisticheskiye Voprosy Klassifikatsii Traditsionnykh i Elektronnykh Dokumentov (Infomational, Legal, and Forensic Issues of Classification of Traditional and Electronic Documents)", *Biblioteka Kriminalista*. 2017.165-167.

<sup>8</sup> V. V. Pushkarev, "Karding - Sistemoobrazuyuschiy Faktor Ekonomicheskoy Prestupnosti: Sekrety Mekhanizma i Problemy Ugolovnoy Presledovaniya", *Biblioteka Kriminalista* Vol: 4 num 33 (2017): 197-204.

Rossinskaya studies the notion of digital footprints and their expert investigation<sup>9</sup>. In his studies, Dzhilkishev identifies the main types of cyber crimes in the Republic of Kazakhstan<sup>10</sup>. Gavrilin considers the opportunities for using forensic techniques for obtaining information from electronic storages<sup>11</sup>. Polyakov conducts a comparative study on electronic, digital, and virtual footprints<sup>12</sup>.

## Hypothesis

The main aim of this study is to identify the traces of criminal activity in the economic sphere. This refers to digital footprints and their detection and fixation.

## Methods

In this study, we used the following methods: sociological case studies which included interviewing the participants of digital economic relationships and law enforcement officials (overall, more than 200 respondents), thus, it helped identify the directions for the development of digital economy, its influence on social and legal spheres; systematic analysis of 82 criminal case materials which helped combine theoretical and empirical material; a structural and forensic method which defines digital footprints as the object of forensic study.

## Results

Modern information technology gives rise to new economic relationships. However, many circumstances associated with the current development of the digital economy are not clear, there also seems to a lack of division between the traditional economy and the digital economy. Moreover, there is a lack of regulatory framework both at the national and international levels. In his research, Bykov addresses the aforementioned issues. The author cites the experience of the USA in shifting from the cybersecurity of federal agencies to the cybersecurity of business<sup>13</sup>.

One of the crucial aspects is creating information infrastructure and information security. We shall mention the emergence of new realia in the economic sphere such as Big Data, Artificial Intelligence (AI) and robotic technology, quantum technologies, and virtual reality. These advancements, blockchain, in particular, are used by criminal structures.

<sup>9</sup> E. R. Rossinskaya, Sistema Chastnoy Teorii Informatsionno-Kompyuternogo Obespecheniya Kriminalisticheskoy Deyatelnosti, in: Sovremennye problemy tsifrovizatsii kriminalisticheskoy i sudebno-ekspertnoy deyatelnosti (Moscow: RG – Press, 2019), 186-187.

<sup>10</sup> R. B. Dzhilkishev, Problemy Rassledovaniya Prestupleniy v Sfere Informatsionnykh Tekhnologiy, in: Issues in Crime Investigation in the Sphere of Information Technology: Aubakirovskiy chteniya (Almaty, 2018), 122-126.

<sup>11</sup> Ju. V. Gavrilin, Ugolovno-Protseessualnye Osnovaniya i Poryadok Primeniya Sredstv Kriminalisticheskoy Tekhniki Ispolzuemoy dlya Issledovaniya Informatsionno-Kommunikatsionnykh Ustroystv (Criminal Procedure Basis and Order for Using Forensic Techniques in Studying Inform), in: Kriminalisticheskoy i operativno-rozysknoye obespecheniye rassledovaniya ekonomicheskikh prestupleniy (Moscow: MSU University Press, 2017), 2-5.

<sup>12</sup> V. V. Polyakov, "K Voprosu ob Ispolzovanii Ponyatiy "Virtualnye Sledy" i "Elektronno-Tsifrovye Sledy" v Kriminalistike", Aktualnye problemy borby s prestupleniyami i inymi pravonarusheniyami Vol: 13 num 1 (2013): 123-125.

<sup>13</sup> A. Ju. Bykov, Pravo tsyfrovoy ekonomiki... 9.

Under the complete digitalization of economic activity, it is possible to run economic entities online. In terms of the 2019-2020 pandemics of COVID-19, this has been proved when the main economic operations are performed through information and telecommunication technology. The capital flow has become more active since the emergence of digital technology.

The analysis of the judicial and investigative experience of the Central Federal District<sup>14</sup> helps conclude that digital technology has become more widespread in illegal activity than in legal economic activity. A significant number of crimes are committed through Internet technology by affecting different gadgets and mobile communication.

The electronic signature is the new technological advancement for authentication in transactions, services, and civil legal relationships. The lack of control in the creation and use of electronic signature has led to its spread in economic relationships. Consequently, it has become a new object of forensic investigation, together with a crypto program for electronic signatures.

According to the Russian legislation, electronic signatures are divided into digital and qualified<sup>15</sup>. However, the legislation falls behind with social demands. Currently, there is no official register of electronic signatures in Russia that are registered in state structures. Electronic signatures for legal entities and individuals are created by parties that have such technical features. The notion of confidentiality of information or data does not encompass the transmission and storage of public or private keys to electronic signatures. Remarkably, according to the current legislation, the organization that creates electronic signatures is not responsible for confidentiality (including security and non-proliferation of access keys). Consequently, we can witness the emergence of criminal organizations that use fake electronic signatures.

Meanwhile, there are several reasons why it is difficult to trace if someone used an electronic signature illegally. Nowadays, electronic signatures are created by limited liability companies (LLCs) with programs such as CryptoArm Start, CryptoPro CSP, etc. This inhibits the process of obtaining information on creating an electronic signature for a particular person for law enforcement agencies unless the electronic signature was created by state structures. Thus, it leads to obstacles to discover if the electronic signature was forged.

Nowadays, there is a tendency of money theft with the use of the Android operating system. Criminals disguised as bank employees offer people to test their operating system, thus founding out which system is not used. To deactivate unused systems, the criminals suggest utilizing a legal application Team Viewer which was initially created to engage with computers. However, criminals use it in conjunction with a mobile phone. It is enough to know a user's ID number to connect to his or her smartphone and to make bank transactions.

These days, the priority has shifted towards smartphones, tablets, and other digital devices. For criminal actions committed via devices powered by Android, iOS, etc., it may require information on incoming and outgoing signals.

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<sup>14</sup> The analysis of judicial and investigative experience of the Central Federal District. Retrieved from: <http://Sudact.ru/regular/doc>

<sup>15</sup> Federal Law "On Electronic Signature" No. 63. April 6, 2011. Retrieved from: <https://rg.ru/2011/04/08/podpis-dok.html>

Usually, the investigators will require information on the identifiers of the device in use, e.g. EMEI, IMSI, and SMS and MMS archives. The analysis of the judicial and investigative practice in the Yaroslavl, Samara, and Moscow regions of Russia shows that there are methods for prompt identification of EMEI number and IP address<sup>16</sup>.

However, the criminals devised a new illegal scheme. It consists in replacing the telephone number with a number of credit organization. It enables criminals to disguise as a bank's security personnel and obtain necessary information about the client and his or her bank accounts. In this case, it is difficult to identify the source IP address. It is crucial to identify the whereabouts of the user at the time of calling.

Overall, it is a simple procedure. However, there are obstacles posed by the interpretation by law enforcement agencies both of the legal procedures for obtaining information and what information is considered to be secret specially protected by law<sup>17</sup>. It becomes particularly crucial when criminals act from abroad.

All the aforementioned circumstances condition the need to improve forensic methods and techniques for identifying and studying digital footprints in the investigation of economic crimes. In this regard, we deem important one of the recent works devoted to using forensic technologies for studying information and communication devices<sup>18</sup>. Also, we suppose it is important to examine digital footprints.

There is much debate over the phenomenon of digital footprints. It also concerns the notion itself. Previously, for marking information obtained through electronic devices, e.g. computers, the term "virtual footprints" was used. Several researchers shared this view<sup>19</sup>. Later, such objects became known as electronic-digital footprints. We should quote the opinion of Rossinskaya who states that "computer software and hardware are used as a tool and when a user makes certain operations, it will create evidentiary information presented in digital form and saved by changing characteristics and condition of the storage medium"<sup>20</sup>. Overall, she believes that in a material sense, digital footprints are a set of certain alphanumeric characters. This point of view is widely shared these days. In the digital economy, tracing criminal activity will differ according to a particular case and will require different technical means and software. Investigating crimes in the digital economy can be ensured by integrating forensic methods and IT. We suppose that crime investigation in digital economy should be undertaken in constant contact with a specialist.

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<sup>16</sup> Judicial practice. Archive of criminal cases in Yaroslavl, Samara, and Moscow regions. Retrieved from: <http://sudact.ru/regular/doc>

<sup>17</sup> A. N. Yakovlev, "Osobennosti Ispolzovaniya v Rassledovanii Prestupleniy Informatsii Pokhozhey na Taynu", *Prestupnosy v sfere informatsionnykh i telekommunikatsionnykh tekhnologiy: problemy preduprezhdeniya, raskrytiya i rassledovaniya prestupleniy num 1 (2016): 5-11.*

<sup>18</sup> Ju. V. Gavrilin, *Ugolovno-Protseessualnye Osnovaniya i Poryadok Primeneniya Sredstv Kriminalisticheskoy Tekhniki Ispolzuemoy dlya Issledovaniya Informatsionno-Kommunikatsionnykh Ustroystv (Criminal Procedure Basis and Order for Using Forensic Techniques in Studying Inform)*, in: *Kriminalisticheskoy i operativno-rozysknoye obespecheniye rassledovaniya ekonomicheskikh prestupleniy (Moscow: MSU University Press, 2017), 37-38.*

<sup>19</sup> V. V. Polyakov, "K Voprosu ob Ispolzovanii Ponyatiy "Virtualnye Sledy" i "Elektronno-Tsifrovye Sledy" v Kriminalistike", *Aktualnye problemy borby s prestupleniyami i inymi pravonarusheniyami Vol: 13 num 1 (2013): 124.*

<sup>20</sup> E. R. Rossinskaya, *Sistema Chastnoy Teorii Informatsionno-Kompyuternogo...*

Furthermore, an expert examination is required to obtain evidentiary information. These days, computer forensics is the most widespread. However, it is efficient when computer systems are used in the crime. It is more difficult to reveal the way the crime was committed if there are more than one provider in the scheme that may locate in different countries. In this case, timing is crucial in tracing digital footprints. When it comes to such an underinvestigated phenomenon as the electronic signature, research is hampered or is not possible since there are no examples for comparative analysis, or it is not possible to obtain them and regard as experimental models of an electronic document or signature. This requires special knowledge in various spheres.

It is crucial to improve technical and forensic tools and methods employed by law enforcement authorities for identifying and fixing digital footprints. In this regard, we agree with Gavrilin on developing a new niche in forensic technique which will deal with studying and investigating electronic media and digital footprints<sup>21</sup>.

## Conclusion

According to the results of our analysis, we can conclude that there is a need for the legal stipulation of such notions as an electronic document and electronic signature not only in Russia, but also at the international level. It is also important to create registers of an electronic signatures and seals in every country in order to facilitate judicial and investigative practices in every sphere.

The great variety of criminal actions in the economic sphere is conditioned by the difficult nature of identifying and fixing digital footprints that are new to forensics. The shift to digital technology in the economy entails the need for law enforcement authorities to obtain knowledge in information and telecommunication technology with an aim to investigate and solve crimes.

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