

Digitalization of the decision-making process in criminal proceedings

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Abstract. The law enforcement behavior of the subject of decision-making in criminal proceedings has developed a certain algorithm in the system of criminal procedure law. Many probabilistic bases existing in the Russian legislation for making procedural decisions, rating expectations of the variable outcome of a procedural decision in a criminal case - all this provides for the need to introduce mathematical methods for researching the actual circumstances of a criminal case, their classification structure and logical justification. The purpose of the research is to identify the features of digitalization of the decision-making process in criminal proceedings. The research used a system of scientific methods, which is based on the principle of consistency, an institutional approach and sociological methods, which made it possible to evaluate the institutional basis for the introduction of mathematical and information and communication methods in the decision-making process in criminal proceedings. In the context of this problem, the authors pay special attention to the blockchain technology, this is a continuous sequential chain of blocks built according to certain rules, containing information, access to which excludes data theft, fraud, violation of property rights, and invasion of the system of making criminal procedural decisions. In the course of the research, they show the main institutional directions in the process of algorithmization of criminal procedure decisions. The article concludes that by applying a universal mathematical language in describing legal phenomena, quantitative values and statistical indicators, the subject of law is able to calculate the optimal correct decision in specific conditions in a criminal case.

1 Introduction

The modern system of criminal procedure acts is based on the conceptual foundations of the domestic adversarial criminal procedure law. The study of the system of law is multidimensional in its essence and content. The genesis of the idea of an optimal, fair and correct decision in the conditions of possible coercion dates back to ancient times. Novgorod birch bark manuscript No. 531 (XI c.) describes the trial, and the manuscript becomes the first official decision in the judicial process of Ancient Russia. Models of procedural decisions were built logically in accordance with the socio-political events in Russia and the stages of development of domestic legislation. First of all, the legal field was filled with ancient judicial decisions ("ordalia", "general search", "written certificates", "princely letters").

The differentiation of decisions in criminal proceedings under adversarial conditions acquired symbolic significance in accordance with the Statute of Criminal Proceedings of 1864, according to which there were proceedings in cases of crimes and misdemeanors:

private complaints, decisions of the judicial investigator, the prosecutor's indictment, the sentences of magistrates.

The theoretical and legal basis for the application of mathematical and information and communication methods in the research of the system of criminal procedure decisions is based on the general scientific term "system". The explanatory Dictionary of the Russian language by V. I. Dal (2002) does not contain the concept of this term. The encyclopedic dictionary "World History of State and Law", edited by A.V. Krutskikh (2001), also does not contain this term. In the encyclopedic dictionary "Political Science" under the general editorship of Yu. I. Averyanov (1993), there is no commentary on this term. In the encyclopedic dictionary of Brockhaus and Efron, "system" (philosophical) is the combination of homogeneous knowledge into one whole, with a common idea and with the purpose of cognizing phenomena or the entire universe.

Sociology offers two concepts of "social system" and "sociotechnical system": the first term is a certain holistic education, the second term is a system education with the inclusion of a technical and technological

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subsystem and a system of roles and functions of service and management personnel [1]. The Legal Encyclopedia provides the concepts of "system of legislation", "system of law", "certification system". It is noted that, first of all, it is a set of phenomena, but, for example, the system of legislation, it is not just a set, but also a differentiated system [2]. The definition of the system of law proposed by R. L. Khachaturov is interesting, as objectively determined by the internal structure of law, expressed in the objectivity and arrangement of normative material in a certain sequence [3].

The final face of any "system" is entrusted to the philosophical and cognitive meaning of this term, which will make it possible to actualize the problem of forming the Concept of using mathematical methods and algorithms in the process of making criminal procedural decisions. The philosophy proceeds that the "system" (greek. Systema is made up of parts, connected - it is a set of interrelated elements that form a whole, unity. The semantic field of the "system" is also indicated: the terms "connection", "element", "whole", "unity", "structure".

The Code of Criminal Procedure of the Russian Federation in Article 5 defined a number of concepts – "procedural decision" (paragraph 55 of Article 5), "court decision" (paragraph 53.1 of Article 5), "final court decision" (paragraph 53.2 of Article 5), "interim court decision" (paragraph 53.3 of Article 5). The last three concepts are included in the Code of Criminal Procedure of the Russian Federation Federal Law No. 443 of 29.12.2010.

The quantitative indicators of the subjects of law authorized to make these decisions are obvious: there are 34000 judges in Russia, 22000 investigators of the Investigative Committee, and 65000 lawyers [4]. The law enforcement behavior of the subject of decision-making in criminal proceedings has developed a certain algorithm in the system of criminal procedure law. The court, as the third power in the state, takes verdicts in the conditions of an adversarial process, "cutting the knot of the right dispute" and, making optimal and correct decisions, which are announced to the public by posting on the information and telecommunications network of the Internet, claim to rating expectations of the variable result of the procedural decision in a criminal case. Here we can recall the traditional judicial statistics – "stability of sentences (court decisions)". Only digital indicators reveal a qualitative indicator of the work of a judge: if a lot of his decisions are canceled and changed, then it is bad, if they are not canceled, then it is good.

If mathematical science turns to abstract categories, it is difficult not to feel a certain temptation to perceive the actual circumstances of the case as a certain "image", "model", "truth". However, the Code of Criminal Procedure of the Russian Federation, when formulating the basis for making variable decisions, defines a certain limit – a concept – a pre-assumed and definite meaning in making a decision. Thus, a number of presumptive bases for making a decision strengthen the arguments of opponents that mathematical abstraction, which is the result of mental activity, is not applicable when applying decisions based on presumptive data: "data giving bases to suspect" (Part 2 of Article 91 of the Code of Criminal

Procedure of the Russian Federation), "the presence of sufficient data to believe" (Part 1 of Article 182 of the Code of Criminal Procedure of the Russian Federation), "if there is sufficient evidence giving base for an accusation" (Part 1 of Article 171 of the Code of Criminal Procedure of the Russian Federation), "sufficient evidence giving basis for an accusation" (Part 1 of Article 223.1 of the Code of Criminal Procedure of the Russian Federation), "arise a doubt" (paragraph 3, Part 1, Article 196 of the Criminal Procedure Code of the Russian Federation).

D. N. Gorshunov believes that, unlike mathematical abstraction, legal abstraction "does not occur through the sequential decision of the problem, the derivation of the formula, but through the detection of signs and the degree of sufficiency" [5].

Thus, the formation of the Concept of applying mathematical and information and communication methods and algorithms in the process of making criminal procedural decisions involves: firstly, the formulation of the concept of a procedural decision; secondly, the definition of a system of probabilistic grounds for making procedural decisions; thirdly, the establishment of rating criteria for the optimal procedural decision; fourthly, the definition of an algorithm for the variable result of a procedural decision in a criminal case; fifthly, the study of the monitoring effect of judicial errors.

2 Problem Statement

The problems of the research are consonant with a number of new terms in law: mathematical methods, artificial intelligence, electronic evidence, cloud storage of information, computer technologies. The array of scientific research extends to many scientific branches: information technologies, information security [5], sociology, legal theories, criminal law, criminal procedure, criminalistics.

Taking into account the purposes of the stated topic, we focus on mathematical methods, electronic and information technologies for making criminal procedural decisions, as well as on the prospect of creating artificial intelligence (robot judge, robot lawyer, robot secretary, robot assistant).

3 Research Questions

1. To characterize the problems of applying mathematical methods in law.
2. To identify gaps in Russian legislation and identify ways to optimize the institutional principles of procedural decision-making and the use of mathematical methods and information technologies in criminal procedure.
3. To determine the main institutional directions in the process of algorithmization of criminal procedure decisions.

4 Purpose of the Study

Identification of the features of the introduction of mathematical methods in the decision-making process in criminal proceedings.

5 Research Methods

The methodological basis of the research is a system of principles and methods of scientific cognition, which were used to evaluate the institutional basis for the introduction of mathematical methods in the decision-making process in criminal proceedings. The following scientific methods were used in the research process:

- general scientific methods (rise from the abstract to the concrete, analysis, synthesis, induction, deduction, modeling, comparison, etc.);
- system method – in a comprehensive research of the process of algorithmization of criminal procedure decision-making.
- institutional method, necessary to describe the key processes of digital transformation (strategic data management) in criminal proceedings.
- sociological methods that allow evaluating the effectiveness of the implementation of mathematical methods in the decision-making process in criminal proceedings on the basis of quantitative and qualitative data.

6 Findings

Currently, the institutional bases for the introduction of mathematical methods in criminal proceedings is being investigated in the following areas [7]. Firstly, it is necessary to use mathematical (formulas, tables, numerical sequences, geometric images), simulation and heuristic models in the investigation of corruption-related official crimes. Secondly, as a general education discipline, mathematics makes it possible to process digital data, use mathematical logic, combinatorics, mathematical statistics and methods of probability theory.

In the study of social phenomena and processes in the legal sciences, it should be noted the effective use of: probability theory, mathematical statistics, mathematical logic, information theory, operations research, and others [8]. In relation to the research topic, we can, for example, talk about the application of probability theory in rating expectations of the variability of the outcome of a court decision. Thus, in Federal Law No. 400-FZ of 02.12.2019 "On Amendments to the Federal Law "On Legal Practice and the Bar in the Russian Federation", paragraph 8 regulates the rule according to which the agreement on the provision of legal assistance may include a condition on the amount of remuneration paid by the trustee, depending on the result of the provision of legal assistance by the lawyer (with the exception of legal assistance in a criminal case and an administrative offense).

When applying the institute of rehabilitation, when claiming compensation for property damage (Part 2 of Article 135 of the Code of Criminal Procedure of the Russian Federation), mathematical calculations are

required for wages, pensions, lost profits and other funds (Paragraph 1 of Part 1 of Article 135 of the Code of Criminal Procedure of the Russian Federation); property confiscated or converted to state income by a court decision (paragraph 2 of Part 1 of Article 135 of the Code of Criminal Procedure of the Russian Federation); fines and procedural costs (Paragraph 3 of Part 1 of Article 135 of the Code of Criminal Procedure of the Russian Federation); amounts paid to rehabilitated persons for providing legal assistance (Part 4 of Article 135 of the Code of Criminal Procedure of the Russian Federation). And if there is a right to partial rehabilitation (termination of criminal prosecution in part or acquittal under a number of articles of the charge), as stated by the legal position of the Constitutional Court of the Russian Federation (ruling of 18.07.2006 No. 279-O) and the Supreme Court of the Russian Federation (Resolution of the Plenum of 29.11.2011 No. 17), then it is necessary to submit to the court an opinion on the amounts calculated by the rehabilitated, taking into account the principles of reasonableness, justice and humanity. Thus, in the literature, in particular, A. M. Erdelevsky offers a table and formulas for calculating the amounts of compensation for moral damage: the death of the victim is 216-576 minimum wage or 720 minimum wage*0.3-0.8; bringing an innocent person to criminal responsibility is 360-720 minimum wage or 720 minimum wage*0.5-1, etc. The authors also propose an optimal formula that can be used to calculate the amount of compensation for damage to the victim. For example, in the dissertation research of R. G. Khasanshina, the application of civil law norms in proving the amounts of compensation to the victim when making procedural decisions is justified. Therefore, she developed a "formula for calculating the amount of lost earnings in compensation for damage to life and health and a formula for determining the amount of compensation for moral damage to the victim".

It should be agreed that when studying mathematical methods in legal practice, statistics, information processing, and the ability to identify a reliable forecast based on available statistical material plays an important role [9]. Criminological researches also do not deny the use of mathematics in law, where the process of formalization of knowledge is possible [10]. You should pay attention to the judicial statistics. Thus, analyzing these data, it should be noted that the total amount of damage from crimes under judicial acts issued in 2014 is 29 billion rubles and this amount is growing exponentially – there are 43 billion rubles only for the first half of 2015. The amount of the compensated damage is 9.4 billion rubles (2014), against 4 billion rubles (2015). The greatest damage from crimes was caused to the personal property of citizens – there are 10.9 billion rubles or 37.6% in the structure of direct damage from crimes determined by judicial acts; state property is 9.3 billion rubles or 32.1 %; private property of legal entities is more than 5 billion rubles or more than 17.3 % of the total amount of damage. The statistics do not take into account suspended and unsolved criminal cases. Thus, we can conclude that there are low rates of compensation for damage to victims [11].

Thus, the bibliographic data on the research problem indicate a high interest of scientists in the application of mathematical methods in jurisprudence. Lawyers in the context of optimizing the system of procedural decisions in criminal proceedings will inevitably accompany the process of making criminal procedural decisions with innovative technologies, electronic resources, mathematical classification basis and programming.

First of all, it is necessary to find out the gaps in the legislation and identify ways to optimize the institutional principles of procedural decision-making and the use of mathematical methods and information technologies in this process.

After the researcher's affirmative answer about the use of mathematical methods in making procedural decisions in criminal cases, the problem of creating an algorithm for making them both individually and as a whole system arises [12].

The formation of the Concept of applying mathematical methods and algorithms in the process of making criminal procedural decisions involves: firstly, the formulation of the concept of a procedural decision; secondly, the definition of a system of probabilistic bases for making procedural decisions; thirdly, the establishment of rating criteria for the optimal procedural decision; fourthly, the definition of an algorithm for the variable result of a procedural decision in a criminal case; fifthly, the study of the monitoring effect of judicial errors; sixthly, anticipating mistakes in making procedural decisions.

In the process of implementing modern criminal procedure norms, law enforcement officers enter into extensive legal relations [14]. The criminal procedure is permeated with a system of procedural decisions - this is the relationship of the participants in the criminal procedure: investigator-prosecutor, investigator-lawyer, prosecutor-lawyer, investigator-victim, court-parties. Most criminal procedural relations have traditionally been typified and regulated for years by procedural procedures and a system of procedural decisions – stages are a vivid example of this.

Here we can formulate a rhetorical question: "Is such cumbersome, multivariate, dispositive principles of criminal justice justified in modern, intersectoral jurisprudence?". What is the difference between the sheets of paper formed into volumes in a criminal case in the XXI century and the same sheets of paper in a criminal case in the XIX-XX centuries? The answer is clear - there is practically nothing. And it's sad. Yes, there are computers, printers, video-film-photo shooting, video-conferencing, that is, modern technologies for creating the text of a procedural document - the result of criminal procedural activity. In this connection, there are prerequisites for the formulation of a legislative initiative on the use of modern digital technologies in making criminal procedural decisions.

P.A. Lupinskaya seems to have laid the institutional bases for the introduction of mathematical methods and algorithmization in the decision-making process, defining, firstly, the stages and phases of law enforcement decision-making, secondly, the legal models of decision-making, and thirdly, the criteria for

choosing a decision and the form of the decision [14]. In another research, P. A. In another research, P. A. Lupinskaya set her task to "consideration the general model of decision-making in criminal proceedings", based on the fact that "the expected result is achieved not only by making the right decision, but also by its appropriate and timely execution" [15]. This, in our opinion, is the purest mathematical formula - to set a problem – to solve a problem – to get a result (answer).

Thus, it is possible to study the decision-making process "from the inside", without researching the procedural procedures according to this formula, only with a certain degree of probability, abstraction or simplification.

The influence of the general theoretical institutional foundations of law, certainly, should oblige the researcher to take individual institutions of criminal procedure and show its system in numerous procedural decisions [16]. The pace in the research is set by the principles of the criminal procedure. Thus, Part 4 of Article 7 of the Criminal Procedure Code of the Russian Federation states that court rulings and decisions of competent officials must be lawful, justified and motivated. None of the lawyers doubt this formula. Yes, this is an algorithm for the internal content of the decision. But any mathematician, programmer, specialist in the field of IT-technologies will ask – and what is it? where are the criteria? - discretion, dispositivity, the subject of law with his life experience. And is it possible for the "artificial intelligence" to ask a number of questions to the subject of the application of the law himself, so that he answers? And at the end of the technology, he would get an answer-clear and specific-about making the only correct decision from multi-variant situations combined, for example, by the stage. And then-the law enforcement officer, according to their knowledge of the law, will determine the possibility of making this decision. Our heuristic model can be implemented only in the conditions of joint efforts of many professions – "heuristic justice".

For example, the model of the validity of decisions in the criminal procedure of Ukraine is given by V. S. Zelenetsky and N. V. Glinskaya. They believe that the means used to confirm the adequacy of the validity of the decision are divided into four groups – factual, normative, logical and linguistic [17]. Indeed, all the elements as a means of ensuring validity are in a complex interaction and are combined into a single whole. Thus, the institution of criminal proceedings, which has now expanded its term to 30 days, is a traditional, historically established stage of the domestic criminal procedure. It would seem that there are only three decisions-in accordance with the list of decisions taken based on the results of consideration of a report on a crime (Article 145 of the Criminal Procedure Code of the Russian Federation).

Nevertheless, at this stage, numerous procedural decisions are made by the body of inquiry, the investigator, the head of the investigative body, the interrogator and the investigator, the prosecutor, the court, and other participants in the process when appealing against the actions of the competent

authorities of the state. The algorithm for making procedural decisions applies: firstly, to the entire system of decisions of this classification group; secondly, it provides a decision of the procedural problem under the conditions of precisely specified procedures by law; thirdly, it provides a sequence of actions that are aimed at achieving the final (optimal) decision in effective ways. For example, digital data when making a criminal procedure decision (terms, dates, quantity, options) have legal significance and ensure the legitimate interests of participants in the criminal procedure. Thus, Federal Law No. 411-FZ of 12.11.2018 made significant changes to the institution of termination of a criminal case. Cancellation of a decision on the termination of a criminal case or criminal prosecution after one year from the date of its issuance is allowed on the basis of a court decision (Part 1.1. Article 214 of the Code of Criminal Procedure of the Russian Federation). The procedural algorithm of this rule is established by a new article - 214.1 of the Code of Criminal Procedure of the Russian Federation. "Judicial procedure for obtaining permission to cancel a decision on the termination of a criminal case or prosecution".

In December 2018, the Council of Europe's European Commission on the Effectiveness of Justice (CEPEJ) adopted the GEPEL European Ethical Charter on the Use of Artificial Intelligence (AI) in Judicial Systems and their Environment, which sets out five basic principles that apply to the processing of court decisions and technical data based on artificial intelligence methods.

The European practice of using artificial intelligence has shown that everything is not so simple and accessible. So, the Court of the Netherlands limited the Government in the use of artificial intelligence. This applies to the use of an automated social security fraud system when a version of the risk modeling algorithm violates the right to privacy. The court ordered to stop using the system-SyRI, developed in 2014, the essence of the technology of which is to model the probability of fraud on the part of persons claiming or receiving benefits. Christian van Veen, who is the director of "The Digital Welfare State and Human Rights" project at New York University School of Law, explained that "SyRI is not a unique system: many other states are experimenting with automated decision-making systems".

In November 2017, the Government's Project Activities Department addressed D. A. In November 2017, the Government's Project Activities Department addressed D. A. Medvedev with proposals to digitalize rule-making and law enforcement: to create "electronic codes", to generate standard court decisions using artificial intelligence, and to create an automated system for monitoring judicial practice. Documents will become easier to write, they will become predictable, and the overall legal technique will improve. An automated legal decisions support system will be able to check decisions for errors and corruption [18].

The Supreme Court of the Russian Federation at the forum "Improving the effectiveness of judicial protection and the legitimate interests of business" noted the demand for the introduction of artificial intelligence in

the judicial system in the context of digitalization, which will ensure the uniformity of judicial practice, professional development and quality of justice, analysis of corruption risks.

It is interesting to think that artificial intelligence can be used as a mediator of the judiciary and increase the level of efficiency and fairness of court decisions and even predict them. The Supreme Court of the Russian Federation has formulated a number of proposals for the modernization of judicial proceedings. Thus, Chairman of the Council of Judges V. A. Momotov on April 4, 2019, spoke at the plenary session of the UI Moscow Legal Forum "The Russian legal System in the context of the Fourth Industrial Revolution" and expressed the opinion that modern technologies will give "a new impetus to such basic principles of judicial proceedings as the independence of judges, legality, accessibility of justice, consideration of cases within a reasonable time, competitiveness, openness and transparency".

The report highlighted the technologies of automated case distribution, video conferencing, electronic document management, electronic form of document exchange between courts, as well as the possibility to apply blockchain technologies [19]. But it is "at least premature" to introduce a neural network instead of a judge, i.e. to automate the entire process of justice and replace the judge with a computer program (neural network) [20].

The essence of digitalization or the key process of digital transformation is the strategic management of data or virtual or real sectors of companies [21]. The virtual sector includes telecom operators, mass media, online stores, and aggregators. The main purpose is to increase the efficiency of using customer data, knowledge about customers. In the real sector, the purpose is to create digital doppelgangers of physical world assets, the technology of which will allow you to use the results of analysis and checks to improve productivity, optimize and implement predictive analytics.

There is a problem of discussing predictive judicial analytics (whether it is possible to know the judge's decisions before they are made) [22]. Rating expectations of the variable outcome of a procedural decision in a criminal case have long been known to practitioners, since the legislative options for the decision-making grounds are different. A comparative legal analysis of the criminal procedure legislation of Russia and foreign countries on the issues of making procedural decisions and the use of modern technologies in their adoption showed the following. For example, weight is a property of evidence when it is evaluated in the evidentiary law of the states of the Anglo-Saxon legal system [23]. The weight of evidence in the United States has relationships with the admissibility and relevance of evidence [24]. Although in the Code of Criminal Procedure of the Russian Federation, the legislator does not express an attitude to either weight or strength, one can only say about the evidentiary value of information on electronic media when they are withdrawn and copied, and here, perhaps, the legislator

meant direct evidence, according to Article 164.1 of the Code of Criminal Procedure of the Russian Federation.

M. S. Sergeev in his dissertation work studied the array of foreign legislation and found out that if the US legislation can be obtained secretly (also under the Federal Law of 12.08.1995 No. 144-FZ), then it is logical to talk about the following implemented programs: “CO-Traveler”, “BoundlessInformant”, “Dropmire”, “X-Keyscore”, “Tempora”. In the context of this problem, attention should be paid to the mechanism of the blockchain – built according to certain rules, a continuous sequential chain of blocks containing information, access to which excludes data theft, fraud, violation of property rights, intrusion into the decision system. The user can only supplement the information, and only the person who owns the key and for whom the information is intended can take it back.

7 Conclusion

In the course of the research, the following results were obtained:

1. Classification bases of variable legislative types of decisions involve the identification of historical traditions in the algorithmization of the formation of procedural decisions.

2. The formation of the Concept of applying mathematical and information and communication methods and algorithms in the process of making criminal procedural decisions involves: firstly, the formulation of the concept of a procedural decision; secondly, the definition of a system of probabilistic bases for making procedural decisions; thirdly, the establishment of rating criteria for the optimal procedural decision; fourthly, the definition of an algorithm for the variable result of a procedural decision in a criminal case; fifthly, the study of the monitoring effect of judicial errors.

3. Bibliographic data on the research problem indicate a high interest of scientists in the application of mathematical methods in jurisprudence [25]. Lawyers in the context of optimizing the system of procedural decisions in criminal proceedings will inevitably accompany the process of making criminal procedural decisions with innovative technologies, electronic resources, mathematical classification basis and programming.

4. It is possible to study the decision-making process "from the inside", without researching the procedural procedures according to this formula, only with a certain degree of probability, abstraction or simplification. Our heuristic model can be implemented only in the conditions of joint efforts of many professions – "heuristic justice".

5. The algorithm for making procedural decisions applies: firstly, to the entire system of decisions of this classification group; secondly, it provides a decision of the procedural problem under the conditions of precisely specified procedures by law; thirdly, it provides a sequence of actions that are aimed at achieving the final (optimal) decision in effective ways.

6. The use of key digital transformation processes (strategic data management) in criminal proceedings will ensure the effective use of information and digital data about the system of procedural decisions and about each individual, using blockchain technology.

7. Algorithmization in the process of making criminal procedural decisions means: firstly, creating a consistent continuous chain of files from the actual circumstances of the case; secondly, creating conditions for the confidentiality of the user of the entire system of this chain of procedural decisions; thirdly, creating a ban for any user to intrude in order to change both an individual decision and the entire system; fourthly, the procedural transparency of making a procedural decision can be provided with the possibility of changing it only to the subject of managing the entire chain.

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