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Using Artificial Intelligence for Competitive Procurements: Legal Regulation Issues

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Abstract

Objective: to substantiate the promising directions of legal regulation of relations in the use of artificial intelligence technologies in competitive (commercial and public) procurement.

Methods: the study was conducted using induction, synthesis, analogy, decomposition of problems and generalization of conclusions. The reasoning was based on the experience of a complex procurement of high-tech equipment. This real-life example was considered as an experimental model for the study and subsequent prediction of the potential use of artificial intelligence technologies in competitive procurement procedures.

Results: advantages and potential risks of using artificial intelligence technologies in procurement work were formulated; recommendations on regulating such use were given. The authors highlighted recommendations of general legal nature concerning the legal personality and delictual capacity of artificial intelligence and proposed the wordings for new norms and options for regulating the use of new procurement tools. It was proved that artificial intelligence technologies, if used thoughtfully, may not only improve the work quality and significantly reduce organizational costs, but also help to develop the basic principles of regulated procurement: transparency of procedures, development of competition for contracts

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between qualified suppliers, reasonableness of decisions, and economic efficiency of the customer's expenditures.

Scientific novelty: despite a large number of works devoted to both the problems of artificial intelligence in general and its use in procurement in particular, the article considers this topic on the basis of mainly inductive reasoning, built on handling a particular case and experience of complex procurement for knowledge-intensive research, refracted through the prism of essential correlation between the basic concepts of "digitalization", "automation", "robotization" and so on.

Practical significance: the directions of using artificial intelligence described in this paper can be implemented by corporate and, in the future, by public customers to improve the quality of their procurement. At the same time, the recommendations on the normative regulation of such innovation seem to be in demand both at the legislative and local levels.

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Contents

Introduction

Competitive procurement is traditionally a regulated activity. The methods of such regulation and the tools prescribed by the regulator vary, while public procurement as a concept does not remain unattended by the legislator in any of the European states. Competition for contracts between potential suppliers remains one of the foundations of public procurement.

At the same time, competition for contracting, being not an end in itself, but only one of the tools to ensure the quality of procurement, exists in the form of various instruments. These tools are gradually changing as economic relations evolve. One of the consequences of this situation is that the qualitative transformation of procurement relations inevitably requires the transformation of the relevant legal regulation. It may

be a question of modernization of existing norms, as well as modernization of the legal doctrine of competitive procurement per se. In the latter case, legal professionals may face the formation of a fundamentally new system of norms.

A new system of legal regulation of procurement may emerge even without regard to economic and technological development, but simply due to the traditions and specificity of the development of local legislation. For example, today we may observe various approaches to competitive procurement, like those provided for by the legislation on the U.S. federal contract system, the Russian legislation on the contract system, the EU Public Procurement Directive of 2014, and the Italian Procurement Code. However, below we will talk only about the problems of legal regulation caused by the use of qualitatively new tools in procurement, and first of all, the so-called artificial intelligence (hereinafter – AI).

For the sphere of legal regulation of procurement today, such a perspective is no longer just abstract theorizing. The digital transformation of modern economic and social relations is manifested, among other things, in the widespread introduction of technologies (conventionally referred to as artificial intelligence) into the business processes of commercial and public procurement. It should be mentioned from the very beginning: at the current level of technology development it is somewhat premature to talk about artificial intelligence in the direct sense of the word. International studies question the correctness of the very naming of neural networks as a full-fledged artificial intelligence and recognizing the possibility of their full-fledged thinking and solving creative tasks (Lee et al., 2021). This basic thesis is important as a starting point in arguments about the applicability and necessity of innovative big data technologies in the activities related to the preparation and conduct of procurement.

It should be noted also that in modern procurement there is no universal tool capable of leveling, or at least minimizing, the risks of any procurement. E-auction, for example, failed to become such a tool. Neural networks will not become such a tool in the foreseeable future. Moreover, when purchasing standardized, serial products, the use of neural networks for market analysis and selection of the winner often appears redundant.

However, when purchasing complex, and even more so unique equipment, the number of factors influencing the quality of the purchase, as well as the interrelations of these factors, is so large that machine processing of information is necessary for successful selection of the winner. Sometimes such processing requires not just automated calculation of parameters according to a matrix predetermined by a human, but the participation of artificial intelligence.

Actually, the amount of data to be processed for a quality purchase, if not beyond human capabilities, then sometimes requires an unjustified amount of resources – in other words, a lot of time of highly qualified specialists. Even worse, while processing this massive amount of data, such specialists will spend most of their time not on expert assessment, but on routine work: comparing indicators, making tables, etc.

Artificial intelligence can do this job incomparably faster, and perhaps better. However, the problem is that decision-making by artificial intelligence within the business processes cannot be fully transparent. Big data processing remains a "black box" for an outside observer to a certain extent: input parameters and the result obtained are clear, but transforming one into the other cannot be fully controlled by a human being.

This raises several questions that require, among other things, legal resolution. Is it appropriate to use artificial intelligence in business processes in general and in procurement in particular? Who is responsible for the decisions made by artificial intelligence? What is the role of humans in this relationship?

Using inductive reasoning from particular to general, as well as based on the methods of synthesis, analogy, generalization and using a practical situation as an experimental model, we will try to answer these questions on the example of procurement of complex products for high-tech research. Below, the basic parameters of this procurement will be presented in the description of the case study; then, the key theses will be proposed in the discussion section and summarized in the conclusion.

1. Subjectivity of AI in procurement relations

First of all, it should be noted that there is no universally established definition of artificial intelligence in general and neural networks in particular. It does not exist in normative acts or legal doctrine. As a rule, researchers write about the combination of digital environment, autonomous functioning of an algorithm, and its ability to self-learning and targeted processing of large arrays of information.

For example, it is proposed to view AI as an electronic system capable of physically manifesting itself, including the ability to sense, process information and influence the world around it to some extent (Calo, 2015). In extreme expression, this approach is manifested in the concept of so-called strong artificial intelligence, under which researchers understand the technology which, by its mental properties and the nature of processing the information available to it, is identical to human consciousness, including in terms of complex interpretation of information and ability to creativity and intuition (Searle, 1990).

An alternative approach to understanding artificial intelligence is based not on the external expression and consequences of its activity, but on the subjective factors of its work. The followers of this approach are ready to call artificial intelligence any intelligence that realizes itself as an independent personality, regardless of whether it is comparable to human intelligence or even inferior to it in terms of intellectual capabilities (Bokovnya et al., 2020). Despite the apparent simplicity of this approach, in today's practice it is not easy to find an example of an AI that identifies itself as not just a thinking subject, but as an independent individual. This is not only due to the imperfection of robotics technologies. Despite the active development of science, the thesis remains relevant that attempts to create artificial intelligence in the true sense of the word have not yet reached the expected level due to discrepancies between the humanity's knowledge of the brain

structure and the capabilities of neurobiology, psychology, and cybernetics (Hawkins & Blakeslee, 2004).

Therefore, today one should recognize that the most realistic concept of artificial intelligence is that of a hardware-software complex having nothing in common with the human mind in terms of the essence of thinking, but capable of solving tasks similar in complexity or more complex (Bokovnya et al., 2020).

For example, in the variant proposed by N. N. Chernogor, the definition of artificial intelligence is as follows: "A technology that defines the ability of some information system to correctly interpret external data (external information) without direct human participation, to refine the database(s) taking these data into account, to learn from the mistakes made and to use the knowledge gained to achieve specific goals, solve specific tasks through flexible adaptation in a poorly defined situation" (Chernogor, 2022). These attributes are best suited, if not for the theory of procurement activity, then, at least, for its practice.

Thoughtful regulation of procurement relations, implemented with the use of artificial intelligence technologies, is impossible without resolving basic questions about the correlation of rights and obligations. In the context of using artificial intelligence technologies, these questions are directly determined by the problem of artificial intelligence subjectivity. Simply put, can we consider artificial intelligence as a subject of legal relations or only as a tool used by other subjects to implement their legal relations?

It is necessary to specify from the very beginning that the issue of the legal subjectivity of artificial intelligence cannot be solved once and for all. "What constitutes AI is subjective and best described as moving target. What AI is for one person may not necessarily be AI for another, what was considered AI say fifteen years ago is nowadays considered commonplace and even the question of 'what is intelligence?' is contested and debated" (Greenstein, 2022). This is the case when not only individual legal relations, but also basic aspects of legal capacity and legal personality depend on the level of technology achieved at a particular time (we are talking not only about the parameters of technology itself, but also about the quality of its application, including in economic relations).

However, today, even with the active development of neural networks and the widespread robotization of production, the thesis remains relevant that the existing concepts of legal capacity and legal capability obviuosly do not provide for even the theoretical possibility that artificial intelligence possesses them, and the application of legal subjectivity to artificial intelligence means only a mechanical extrapolation of human rights to the actions of artificial intelligence (Nevejans, 2016).

This is largely due to the fact that law as a product of human intellectual activity and a result of social relations development is anthropocentric by its very nature. Not even subjectivity as such, but the legal subjectivity of entities that are not identical to humans, is a fundamentally new category for the system of existing legal institutions. But no less important is the fact that AI activity in its external expression today does not imply, not to mention identity, but even close similarity to human activity, even taking into account

that the speed and volume of information processing by a neural network quantitatively incomparably exceed human abilities. This means that "the approaches proposing to justify the legal personality of robots and AI taking into account the essence of animated subjects who have real, not only formal-legal will, will be developed only after the development of digital technologies reaches an objectively high level" (Begishev, 2020).

At the same time, the conventionality of the term "artificial intelligence" does not mean that the technology itself is doubtful. Self-learning algorithms for big data processing are already showing their applied significance. Not being a panacea, big data processing technologies, and in particular, those called neural networks, are a factor of economic success in the modern world.

Undoubtedly, economic success requires rational and thoughtful "targeted" application of neural networks in those spheres of economic relations where they can bring maximum benefit. This, in turn, requires modern regulation based both on understanding of the essence of economic relations and on understanding of modern technologies.

The use of such technologies in procurement should be based on the primacy of the fact that "relations with the use of artificial intelligence are always relations between subjects of law or in relation to objects of law. In any case, these are relations that at one stage or another are initiated, or programmed, by a person – a subject of law with a certain degree of liability (including within the activities of legal entities). The human will for certain actions of artificial intelligence can be expressed in different degrees: from AI actions under the full control of human will to autonomous AI actions, also allowed and realized in their possible limits and consequences by a person (group of persons)" (Shakhnazarov, 2022). Only this approach today allows us to solve a number of organizational and legal issues: from the definition of the sphere of effective AI application to the distribution of responsibility for the consequences of its functioning.

Today, we can only partially agree with the thesis that "legal professionals do not have to comprehend the mathematical and technical mysteries of digitalization; digitalization is not a matter of legal science. We have to write about this because many of those who have devoted their research to digitalization ignore the fact that sciences are divided into technical and social ones; legal sciences are social ones and technical norms are not the subject matter of their analysis" (Lazarev, 2023). However, this thought reminds us of the most important thesis: a regulator must not and cannot replace an engineer. The law created by the regulator must be adequate to the regulated relations, which in the case of AI regulation is impossible without participation of experts in modern technologies.

At the same time, experts in digital technologies, AI in particular, must not replace the regulator and try to use legal categories that are not typical for certain relations to regulate them. This is especially important when we talk about the legal consequences of relations implemented with the use of modern digital technologies. "From the ontological viewpoint, all advanced technologies are not subjects but objects, and there is no reason to grant them rights or hold them legally liable. Even in light

of the existing rules of legal liability, based on various legal criteria, it is always theoretically possible to identify a person who would be liable for damages resulting from the production or operation of a device with an AI system" (Ivliev & Egorova, 2022).

A specific consequence of the AI legal personality issue is the question of its tortability. Regulation of AI is required, among other things, to prevent the dilution of responsibility for the consequences of AI operation. The matrix of such liability is a topic for a separate study, but in any case, today it is important to remember the basic principle: a definite physical or legal person is liable for the consequences of the work of artificial intelligence.

Due to the specificity of AI tortability, or rather due to its absence at the current stage of its development, the introduction of this technology can only be heterogeneous. Maximally simplifying, the degree of AI diffusion should be inversely proportional to the risk to human life and health in the relevant sphere.

In practice, the use of AI in economic activities is associated with the risk of harm caused by it, which is also the subject of special research (Bertolini, 2013). At the same time, US experts are already discussing the need to implement the concept of criminal liability for AI actions, taking into account the guilt of the creator, programmer, user and other persons involved in the work of AI (Hallevy, 2013). An alternative solution to the issue is to give artificial intelligence the legal personality of legal entities, such as corporations: this approach allows applying liability to AI with the help of legal fiction and at the same time provide real compensation for the damage caused (Chesterman, 2020).

On the one hand, the use of AI technologies in the preparation of procurement, in the description of requirements to the products to be procured, in the selection of the winner of the procurement and at other stages of procurement process allows minimizing the risk of subjectivism of the customer's official. This risk is traditionally considered to be one of the fundamental risks in procurement. On the other hand, AI technology gives rise to a number of specific risks due to its use, or, more precisely, its imperfections.

"Using AI models may lead to risks based on incorrect or misinterpreted model results. The risk actualization may lead to financial losses, erroneous decisions, and reputational consequences. <...> The model may contain fundamental errors (e.g., program code errors), which may lead to incorrect calculations and inaccurate forecasts. The model may be misused. Because AI models are trained to solve specific problems, applying them to solve other problems may lead to erroneous performance results. The data used in the model operation may differ significantly in statistics from the data on which it was developed. Inaccurate and incomplete data may distort the process of identifying patterns and lead to erroneous results"[1].

[1] Bank of Russia. (2023). Using artificial intelligence in financial markets: report for public consultations (pp. 28–29). Moscow.

The risks associated with information security are also intuitively obvious in the context of using AI. Moreover, these risks can be actualized both as confidential information leakage and as malicious influence on the algorithms of information processing in order to distort the results of such processing.

Finally, it should be mentioned that both researchers and practitioners note that neural networks are subject to the risk of "drift": the functional abilities of the model in solving individual tasks regress over time[2]. The question of the reasons for such regression remains open, but the very existence of such a risk should be taken into account, both when AI is introduced into business processes and when the relevel regulatory norms are formulated.

2. Sphere of using AI in procurement

To determine where AI can be used effectively, at least two factors should be combined. First, the customer must have well-developed and streamlined procurement practices with completed stages of digitalization and automation. It is extremely difficult and often unreasonable to use AI technologies where some procurement documents are paper-based and decisions are made by nontransparent rules. Secondly, it is necessary to identify those procurements where the use of AI would have an obvious positive impact on the result. And, of course, the introduction of modern AI technologies requires organizational, financial and time investments; therefore, one must make sure that these investments will pay off with the effect of AI application.

Speaking of the first factor, we should first of all distinguish between the concepts of digitalization and automation. Digitalization refers to the transfer of business processes into an electronic environment. As a rule, digitalization involves executing business processes on the Internet and certifying transactions with electronic signatures. Digitalization is a necessary but not sufficient condition on the way to automation, as it often does not imply optimization of existing business processes. On the contrary, automation means exactly the optimization of business processes through the introduction of machine processing of information, thus representing the next qualitative step in the introduction of electronic technologies.

The Russian contract system (although it is not unique in terms of the aspects listed below) can be given as an example. Its digitalization began in the early 21st century. At first, the institute of electronic signature was legally regulated to serve as a legal basis for performing legally significant actions in the electronic environment. Soon after that, electronic trading platforms – specialized portals for competitive procurement in electronic form – began to emerge. Then the largest customers gradually digitized the entire cycle of procurement relations from procurement forecasting and planning to contract conclusion and execution.

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[2] Chen, L., Zaharia, M., & Zou, J. (2023, July). How is ChatGPT's Behavior Changing over Time? https://clck.ly/3CdmQ3

The Law of the People's Republic of China dated August 31, 2018 "On E-Commerce" regulated the concept of an operator of an electronic trading platform as an organization that provides two or more parties with the opportunity to trade services, run online stores, search for sellers and buyers, and publish information necessary for such activities[3]. The Chinese legislator distinguished three types of similar entities involved in the operation of ETPs:

– an ETP operator as an incorporated or unincorporated entity that offers an online space for digital business and the parties' mutual settlements, information exchange and other services that facilitate the conclusion of an e-commerce transaction by its parties;

– an operator functioning on an ETP, i.e. a user of an electronic trading platform;

– an online seller as a participant in the e-commerce market that does not use an ETP, but sells goods, works or services via one's own website or via other information channels on the Internet.

This said, the ETP operator has the obligation to ensure cybersecurity[4], as well as the formation and maintenance of a system evaluating the users conducting business activities via the ETP[5].

Procurement in electronic form allowed significantly increasing the transparency of work (which is especially important for public procurement), as well as to optimize organizational costs of procurement business processes. But in essence, these were the same business processes that had previously taken place outside the digital environment. To qualitatively modernize the business processes, automation tools were gradually introduced into procurement, namely, processing of certain amounts of information according to a set algorithm without human participation. An example of such automation in procurement is end-to-end data inheritance: information of the previous document is pre-filled in the forms of each subsequent document within a single procurement cycle. Another example is the automated selection and ranking of preliminary offers for supply; in Russia the procedure is called small electronic procurement, and in international practice – dynamic procurement ("Dynamic purchasing systems" in the Directive 2014/24/EU on public procurement[6] and "Sistemi dinamici di acquisizione" in the Italian Procurement Code[7]).

Hence, it can be stated that since the beginning of the 21st century, "qualitative changes have taken place in Russian procurement. At the moment, not only the issues of modernization of business processes and economic efficiency come to the forefront. The state is trying to systematically approach the procurement issues by optimizing all

3 Art. 9 Law of the People's Republic of China dated August 31, 2018 "On E-Commerce".

4 Art 30. Law of the People's Republic of China dated August 31, 2018 "On E-Commerce".

5 Art 39. Law of the People's Republic of China dated August 31, 2018 "On E-Commerce".

6 Art. 34 Directive 2014/24/EU on public procurement.

7 Art. 55 Codice dei contratti pubblici.

related processes at each stage of the procedure and introducing end-to-end automation. As noted by customers, electronic procurement procedures provide optimization of budget and labor costs, increasing procurement efficiency by an average of 25–30%" (Shmeleva, 2019a).

If end-to-end digitalization is implemented and automation tools of at least the basic "nodes" of procurement are introduced, we can talk about the presence of prerequisites for using artificial intelligence technologies. However, even with such a basis, one should not strive for total application of AI to the entire spectrum of procurement activities. From the viewpoint of optimizing business processes, neural networks are needed only where their application will help to significantly reduce time costs and at the same time improve the quality of procurement.

As a practical example, consider a procurement that actually took place during the construction of a magnetic path on a project at one of Europe's largest research centers specializing in nuclear physics. The project required a new accelerator facility to study the properties of dense baryonic matter.

The magnetic path necessary for the operation of this particle accelerator facility is a quickly erectable structure weighing more than 700 tons with special material and magnetic properties. The magnetic path housing is a key part of the detector operating as part of the accelerator complex. Both the purpose of this complex and the technical characteristics of the magnetic path can undoubtedly be categorized as science-intensive.

The Research and Development Center as the project's lead organization developed the design documentation of the future magnetic path. According to the design documentation, the production of the main parts of the magnetic path was divided between two manufacturers, which were to perform production in parallel. Parallel production, in turn, was necessary to meet the project implementation deadlines.

Manufacturers were plants in different countries: one of them was located in Kramatorsk and the other in Genoa. The parts manufactured at these plants were sent to the Czech Republic for processing and preliminary assembly. Also, in the Czech Republic, structures were produced to transport the individual parts of the product to the R&D center, the place of their final installation.

After manufacturing at the factories, the basic construction elements underwent a complex process of acceptance testing, in which parameters of each element, such as size, chemical composition, mechanical properties, magnetic properties, etc., were strictly checked. If even one of the parameters was found to be deviated, the entire project could have been jeopardized.

After successful acceptance at the manufacturing plants, the semiproducts were shipped to the Czech Republic. Given that the semiproducts were produced in different countries, it was important to ensure that the correct customs regime for importing them into the Czech Republic was selected for their subsequent simultaneous processing. In order to start processing the supplied semiproducts, the Czech plant developed its

own engineering documentation based on the R&D center's documentation, which included the following sections:

1. Input inspection of semiproducts: measurement of dimensions, measurement of parts geometry, preparation of technical data sheets.

2. Procedure for processing of semiproducts.

3. Requirements for the manufacture of parts necessary for the assembly of the magnetic path.

4. Requirements for the manufacture of tooling for the assembly and disassembly of the magnetic path.

5. Worksheet of the magnetic path control assembly at the factory with the participation of representatives of the research center, including installation and adjustment of the mutual arrangement of the cradle parts.

6. Methodology for measuring the horizontality of the base plates and control measurements of the plate geometry at various stages of assembly.

7. Procedure of preparation for shipment: drilling of holes and location of fixing pins after control assembly, marking of pins, creation of a map of pin location, disassembly, packing, loading, and transportation.

Finally, the R&D center organized a temporary customs zone for customs clearance of components imported from the Czech Republic. This was due to the size and weight of the individual parts, which did not allow the said products to be brought to standard customs terminals.

The example briefly described above shows that the integrated procurement of high-tech products is a full-fledged multi-stage project that may involve enterprises from different countries. This procurement is not limited to a tender, but includes tasks in a wide range of areas. Each of these tasks is closely related to adjacent ones and directly affects the success of the entire project. Successful implementation of such a purchase requires expert research in engineering and technology, logistics, customs clearance, accounting, the tender per se, and the preparation and conclusion of an international contract. The procurement complexity is aggravated by the fact that failure in any of these areas makes it impossible for the end user to run the high-tech product.

What key risks can be seen in the above example?

First of all, it is the risk of choosing a supplier. An inexperienced, unskilled manufacturer (or simply a plant without the necessary equipment) will not be able to produce the relevant high-tech products.

The second risk is the risk of errors in technical documentation. Incorrect calculation or just incorrect description of data at one of the manufacturing or assembly stages can jeopardize the result of the entire delivery.

The third risk is the risk of transportation. It is important to take into account that the dimensions and weight of individual elements of the described equipment required a dozen trucks for transportation. At the same time, the cost of high-tech products dictated increased requirements for safety during transportation.

Since the purchase of high-tech products is often associated with international cooperation, the risk of customs clearance is next to the logistics risk. The fact that the end

user was a scientific organization located outside the EU only increased the significance of this risk.

Finally, one cannot discount the risk of errors in contractual arrangements and payments for manufacturing, set-up and transportation. Correct, timely and accurately executed settlements for such a purchase are a challenge. Unforeseen offsets and the need, for example, to purchase additional tools for the contractor at the customer's expense only add to the difficulties and increase the risk of unintentional error.

Traditionally, such risks are fully assigned to the customer and supplier employees. In this situation, the possibility of minimizing each risk depends entirely on the employee's qualification, level of knowledge, the amount of information available and the time for its processing. However, the modern level of information and management technologies makes it possible to separate human professional knowledge and competence from the tasks of collecting and processing information. After all, AI is capable of processing incomparably large amounts of information in much less time.

It seems that for solving exactly such tasks in the field of business management, the key issue is not the essence of cognitive processes or self-identification, but the ability to process large volumes of information in less time and at lower costs compared to a human or a group of people. Big data processing is an area of effective application of artificial intelligence. In the above example, it can be, first, data on the qualifications of potential producers, including information about their experience, qualification of employees, production culture, availability of necessary equipment, compliance with social and environmental responsibility, financial sustainability, etc. Secondly, it is data on possible logistical combinations and related transportation, administrative, weather and other risks. Thirdly, it is processing an array of engineering and technical information and forming proposals for the optimal parameters.

"When making purchases, managers and specialists have to study a huge amount of information to make the best decision. A lot of processes depend on the human factor, subjective opinion, established stereotypes of thinking. Artificial intelligence in procurement has a number of undeniable advantages. These are, for example:

1. Analyzing information about suppliers. Artificial intelligence is able to quickly and effectively provide work with suppliers. It easily finds counterparties and their contacts, provides information about the company financial condition and analyzes customer feedback on the quality of their work. At the same time, the time to process information is significantly reduced and its quantity is increased.

2. Cost management. Artificial intelligence based on machine learning can analyze costs for a certain period of time and identify situations in which there was a real opportunity to save money. Program complexes are able to quickly compare purchase prices, compare them with indices on the market and recommend a more favorable offer.

3. Risk management. Artificial intelligence collects information about possible risks in the supply chain. In doing so, the business can increase the speed of order processing, optimize costs and improve the quality of purchased products <...>.

4. Planning the purchase volume and price. Artificial intelligence takes into account average costs for the previous period and significant changes that can make differences. To calculate the optimal price, it uses data on the company's budget, general market situation, characteristics of demand and tax obligations"[8].

It is important to emphasize: information processing is not the same as decision making. In the case of robotic procurement, this means that the expertise of authorized employees is not removed from procurement preparing and conducting. The AI merely offers the experts collected, prepared and structured information. At the same time, the expert has the authority to both verify and supplement the data provided by the AI and to formulate conclusions based on that data. In other words, the rational use of AI technologies in procurement does not exclude, but enhances the expert component of human work.

3. AI when preparing procurement

Conventionally, the use of AI in procurement can be divided into robotization of procurement preparation and robotization of procurement implementation. These two areas can be developed and regulated in parallel and separately.

For example, today market research as a crucial stage of regulated procurement is often ignored or largely reduced. However, it is market research that can give an adequate answer to the question not only about the initial (maximum) price, but also about the most effective procurement method. Neural network is able to collect and process information from the maximum number of open sources in minimal time, as well as to structure it according to the parameters set by a human.

Thus, for a reasonable price calculation, it is important to take into account not only abstract indicators like inflation rate or several price lists from randomly selected suppliers, but also factors of seasonality, logistics, availability of production facilities and volumes of these facilities, cost of ownership, costs of potential equipment repairs and associated downtime, etc. Taking into account all these factors, the price becomes not a rather conventional indicator, but the results of actual market research. Also, by using a neural network, the much-speculated human factor, which in one form or another has a significant impact on the results of determining the initial maximum price (hereinafter – IMP), can potentially be minimized to a certain extent, if not completely eliminated.

No less important is the choice of a relevant procurement method based on the market research results: the statistics of failed auctions inevitably suggests that classical price competition may not always give the expected effect to a customer. To choose the best method, it is important to take into account the level of formal and actual competition in the market of products to be purchased, the degree of price elasticity (without which the auction loses much of its meaning), the importance of non-price factors in choosing

8 Big data in procurement management. Platforma. https://clck.ly/3CdmRP

the best offer, and in the case of public procurement – also the reputation of the contract system among local suppliers. Such research requires processing of even larger amount of information than when justifying the IMP. A neural network could well serve as a tool for processing such information.

One cannot but mention such labor-intensive work as compiling requirements to the products to be procured and requirements to the procurement participants. Both categories of requirements must simultaneously satisfy the utmost accuracy of description (to guarantee the delivery of quality products to the customer) and universality of wording (to avoid unreasonable restriction of competition). If we are not talking about ordering serial mass-market products, but, for example, about installing engineering infrastructure, then the urgent need to draw up complex technical documentation is added to the above.

Procurement preparation has traditionally remained an internal matter for the client. This is true even though public procurement laws in most countries regulate some elements of such preparation in one way or another – for example, selection of the procurement method, drafting requirements for potential suppliers, etc. It can be argued that the introduction of AI technologies in preparation for the competitive procurement announcement will not require breaking existing norms or radical changes in legal relations in procurement. It is more appropriate to speak not so much about changing the legislation, but about supplementing it.

For example, the choice of a procurement method from among the tools provided for by the legislation may be legally stipulated based on not only formal attributes of procurement (such as the size of IMP or the category of products to be purchased), but also the results of market research conducted by AI. In both cases, the human factor, potentially involving a risk of abuse, is excluded from decision-making. In both cases, the grounds for selecting a procurement method remain transparent. At the same time, the selection of a procurement method based on the results of AI research may in many cases be more effective in terms of actual procurement practice than making the same decision based on formal criteria.

Simply put, all that is needed to use AI in procurement preparation is its legalization. The procurement preparation may become simpler and more efficient. At the same time, the introduction of AI will neither fundamentally revise nor dilute the procurement preparation process.

4. AI when conducting procurement

The situation is somewhat different when it comes to the introduction of AI into the procedure of competitive supplier identification. This activity traditionally belongs to the tender commission. Although the AI use will not lead to the exclusion of the commission from the procurement work (key decisions on the selection of the tender winner will in any case be taken collegially), but the AI involvement in the commission

work will require an essential adjustment not only of the norms, but partly even of the established institutions of procurement legislation.

New technologies do not and should not encroach on such fundamental principles as transparency and efficiency of public procurement. The use of these technologies should not lead to unreasonable restriction of competition between potential suppliers. However, the very tools for implementing these basic principles in practice may undergo significant change with the introduction of AI.

For example, traditionally, the powers of the tender commission include the decision on the compliance or non-compliance of a bidder with the requirements of the procurement documentation. This is one of the key decisions in the procurement process, as only suppliers recognized as compliant with the requirements of the procurement documentation can claim victory. Often, making this decision involves the examination of a large volume of documents submitted by suppliers. But we should not forget that the use of AI will help to significantly reduce the labor costs of such in-house procedures.

Already today, a participant in a regulated procurement declares its compliance with a number of requirements. If the status of the declaration legally included the right of the customer to verify its contents, then such verification could be entrusted to a neural network. Of course, both positive and negative results of the verification should contain a reference to the information sources that served as a justification for the decision, while the decision itself remains with the procurement commission.

Reducing the cost of checks through the use of AI will allow taking into account a wider range of factors affecting the supply quality during such checks. For example, already today, PRC legislation very rationally requires: "If the matter of a tender is a project involving construction work, the bid shall contain brief biographical information and work experience of the prospective project manager and key technical personnel, as well as the technical specifications of the equipment that will be involved in the project"[9]. Not only work experience, but also the history of interaction with previous customers, the equipment used for production, the culture of production and even the chain of suppliers – all these factors are essential and sometimes decisive for the selection of a contractor, especially when ordering the manufacture of complex and high-tech products.

At the same time, we should not think that AI will autonomously select the procurement winner and reject the proposals of their competitors. Here it is appropriate to recall the theses with which this article began: if we consider AI not as a subject, but as a tool for procurement, then authorized specialists should be responsible for the consequences of processing information with the help of a neural network. This means that first in the corporate and then in the normative regulation it is necessary to establish a matrix distributing responsibility for the consequences of the use of neural network

[9] Art. 27 of the Law of the People's Republic of China of 30.08.1999 "On tenders".

between such specialists and other subjects that influenced the AI in processing particular information.

At the same time, it would be wrong to assume that the distribution of responsibility for the AI work means an increase in the responsibility of authorized subjects. By and large, there is no question of new spheres of responsibility at all: today, tender commission specialists are just as responsible for the validity of decisions to evaluate and compare bids, and tools like neural networks only facilitate the preparatory work for making such a decision.

This thesis is also true for one of the boldest areas of AI potential use in procurement – selecting the procurement winner. Of course, we are talking about multifactor selection. After all, to speed up an auction, a combination of automation tools and suppliers' preliminary offers is largely sufficient. But if one needs to find the balance between price and quality, then it is neural networks that can be authorized for such multi-criterial comparison.

Without being a subject of a legal relationship, AI can become a participant in it simply because it can ensure higher efficiency of economic relations. "Lawyers should already develop norms regulating situations where autonomous algorithms will be able to complement and replace human discretion in determining optimal legal norms and will be able to find relevant differences between people and use them to personalize sanctions, rights and obligations" (Kharitonova & Qi Sun, 2023). With AI, it is possible to use a large number of criteria for comparing offers while maintaining the overall transparency of the comparison logic. This approach, among other things, will help to significantly minimize the risk of subjectivity in evaluation. After all, this risk is one of the most popular arguments when criticizing any alternative to the auction.

One should not forget the dynamic procurements mentioned above. For their success, suppliers need to place and duly update their preliminary offers for supply on a specialized platform. When the customer declares the need for a particular product on that platform, the platform algorithms automatically select preliminary offers relevant to this need. Thus, a full-fledged comparison of competing offers is carried out, but due to the automation of collecting these offers, the whole procedure takes a few days, not weeks, as it is required by the classical tender.

However, the success of such a competitive procedure requires the quality of not only the customer's description of their need, but also the potential supplier's description of their preliminary offer. Today, AI technologies are already quite capable of optimizing both descriptions (of course, the final revision is left to humans in any case). In addition, in dynamic procurement, AI could remind suppliers of factors that may require them to update their preliminary offers.

Finally, it is appropriate to use a neural network for such highly specialized, yet extremely important work as determining the category of products offered by a supplier, because the accuracy of the category definition may determine whether a preliminary offer gets into the automated sample. "When users post information about their products in the catalog, they have to assign them to a certain category: paper, printing products, medical

products, pet products, stationery, textiles, engineering and construction products, furniture, etc. Earlier, they had to manually select the right category from a long list, which was time-consuming. Neural network has spared suppliers from the routine procedure. It is sufficient to upload a picture of the product, and the artificial intelligence will analyze it in a few seconds, then offer suitable categories to choose from. According to statistics, the accuracy of the category definition today is 92 %. This figure will grow as the neural network, like a chatbot, is constantly learning and adding to its knowledge based on different models"[10].

The examples described above do not exhaust the potential of using AI in competitive procurement. Some of the directions described above practically do not require adjustment of the legislation – for example, the use of neural networks to improve the efficiency of dynamic procurement. Other directions will require the formulation of norms and rules for the use of new, previously unknown tools – for example, multi-criteria selection of the winner with participation of AI. But in any case, we can say that the use of digital technologies is already becoming a factor in the quality of procurement.

Conclusions

Summarizing the above, we should recognize that it is impossible to introduce artificial intelligence technologies in procurement without adjusting the existing regulations. However, it is in the field of procurement that we are talking only about adjustments, not about breaking the entire regulatory system. At the same time, from the viewpoint of the regulated relations, the introduction of artificial intelligence technologies seems both appropriate and justified. These technologies, if used thoughtfully, can not only improve the quality of work and significantly reduce organizational costs, but also serve to develop the basic principles of regulated procurement: transparency of procedures, development of competition for contracts between qualified suppliers, reasonableness of decisions, and economic efficiency of using the customer's money.

As a minimum, the following areas of AI potential introduction into procurement can be identified:

1. Forecasting the need for purchased products and managing warehouse reserves in general.
2. Managing current contracts, controlling their execution.
3. Assessing the needs and evaluating the necessity of procurement to fulfill them.
4. Assessing risks.
5. Formulating a list of requirements for the subject matter of the procurement, preparing procurement documentation.

[10] Smart procurement: how artificial intelligence and API services help the users of Suppliers' platform. (2023, March 17). Tadviser. https://clck.ly/3CdnFb

6. Preliminary research of the market for the products to be procured, selecting procurement tools.

7. Collecting proposals from potential suppliers.

8. Evaluating and comparing proposals of potential suppliers.

9. Managing supplies.

In each of these areas, AI does not replace humans, but only helps them to make better-informed decisions while spending less time and effort on such decisions. "Artificial intelligence should replace routine processes: collecting, filtering and classifying data on expenditures, after which signs of irrational spending are identified in an automated mode. Analytics is primarily based on information about purchases already made. As a result, the use of artificial intelligence technologies in the procurement automation will significantly expand program capabilities in the areas of automated price monitoring, comparison of procured goods, which will make it possible to select the most optimal contractor" (Sergeeva, 2022).

Therefore, the enquiry for the legal expert community consists only in identifying pilot areas for the use of neural networks in procurement, outlining the framework for the use of this technology in these areas, and regulating the powers and responsibilities of the subject of the use of neural networks. This work will require technological expertise. However, it does not look unfeasible. Then, its results will serve as a basis for the gradual introduction of modern technologies in related industries (Siciliani et al., 2023; Burger & Nietsche, 2023).

Yes, within the current norms, the implementation of neural networks in all the named fields is not an easy task. Even generalizing as much as possible, it is worth remembering that "the digitalization of public procurement is not just a matter of acquiring the most advanced technologies. It also requires changes in procurement tools and methods that would allow the state to interact with new technologies, as well as effectively and quickly integrate them into practical reality" (Shmeleva, 2019b). However, fundamental, revolutionary transformations in such implementation may well be avoided.

The point is that in all the situations described above, the neural network remains a tool by its status, while a human being remains the decision-maker. Moreover, when using a digital tool, both the input parameters, set to the neural network for information processing, and the output parameters are fixed and thus become transparent. The authorized entity may accept or change them. The justification for the changing is also recorded in the electronic environment.

In other words, it is in the field of procurement that the introduction of artificial intelligence as one of the tools is possible while preserving the body of the current legislation in general and the system of information support of procurement in particular. It will only require to supplement certain norms, such as norms on IMP justification, evaluation of procurement participants, etc., through legalization of an alternative decision-making mechanism. It is important that this mechanism is aimed not only at increasing the speed of processing large amounts of information, but also at minimizing the risk of subjectivity

in decision-making. Simply put, the use of neural networks does not violate, but develops the principles of procurement regulation.

It is by no means a question of completely replacing contractual services with neural networks, as is often discussed in relation to other professions. In procurement, the task of a neural network is exactly the opposite: firstly, to facilitate the work of the contract service by "taking over" labor-intensive routine, and secondly, to enable contract service staff to focus on issues requiring high professional expertise.

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Использование искусственного интеллекта для проведения конкурентных закупок: проблемы правового регулирования

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Ключевые слова

аукцион,
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закупка,
искусственный интеллект,
конкуренция,
нейросеть,
право,
регулирование,
тендер,
цифровые технологии

Аннотация

Цель: обоснование перспективных направлений правового регулирования отношений, связанных с использованием технологий искусственного интеллекта в конкурентных (коммерческих и публичных) закупках.

Методы: исследование проводилось на основе индукции, синтеза, аналогии, декомпозиции проблематики и обобщения выводов. Рассуждения строились на опыте проведения сложной закупки высокотехнологичного оборудования. Этот реальный пример был рассмотрен в качестве экспериментальной модели для исследования с последующим прогнозированием потенциального использования технологий искусственного интеллекта в конкурентных закупочных процедурах.

Результаты: сформулированы преимущества и потенциальные риски использования технологий искусственного интеллекта в закупочной работе, а также даны рекомендации по регулированию такого использования. Выделены рекомендации общеправового характера, касающиеся правосубъектности и деликтоспособности искусственного интеллекта, предложены формулировки новых норм, варианты регулирования использования новых инструментов проведения закупок. Доказано, что технологии искусственного интеллекта при продуманном использовании способны не только повысить качество работы и существенно снизить организационные издержки, но и при этом послужить развитию базовых принципов регулируемых закупок:

✉ Контактное лицо

прозрачности процедур, развития конкуренции за подряд между квалифицированными поставщиками, обоснованности решений, экономической эффективности использования денежных средств заказчика.

Научная новизна: несмотря на большое количество работ, посвященных как проблематике искусственного интеллекта в целом, так и его использованию в закупках в частности, данная проблематика рассматривается в статье на основе преимущественно индуктивного рассуждения, строящегося на рассмотрении частного случая и опыте проведения сложной закупки для цели наукоемких исследований, преломляющегося через призму сущностного соотнесения между собой базовых понятий «цифровизация», «автоматизация», «роботизация» и т. п.

Практическая значимость: описанные в настоящей работе направления использования искусственного интеллекта могут быть реализованы корпоративными, а в перспективе и государственными заказчиками для повышения качества своих закупок. При этом рекомендации по нормативному регулированию такой инновации представляются востребованными как на законодательном, так и на локальном уровне.

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Дата принятия к опубликованию – 25 сентября 2024 г.
Дата онлайн-размещения – 30 сентября 2024 г.