Artificial Intelligence in the Cadastral System of Uzbekistan: Application Problems and Solutions

Toshboeva Robiya Sobirovna

Department of Business Law, Tashkent State Law University, Tashkent, Uzbekistan

Abstract. The modern natural resource cadastral system of Uzbekistan is a two-dimensional flat cadastral system in 2D format, reflecting an object in a flat state, which does not provide clear information about the projections of protruding structures that overlap each other. Such cadastral models are not able to provide complete information about modern architecture with overlapping parts, which subsequently leads to incorrect decisions and the appearance of "cadastral errors". In such conditions, the use of artificial intelligence capabilities to increase the effectiveness of reforming the cadastral system as a whole. The Digital Uzbekistan 2030 Strategy, adopted in 2020 as a priority area for the development of digital infrastructure, consolidated the improvement of the mechanism for storing, processing, protecting information and the convenience of using electronic public services for government agencies, individuals and legal entities throughout the territory. But insufficient legal regulation of this issue, caused by the lack of regulation of the legal status of artificial intelligence in national legislation, delays the process of its full application and equalization along with traditional information.

Keywords: cadastre of natural resources, artificial intelligence, computer modeling, vertical real estate, ethical standards, urbanization, Special support regime for artificial intelligence technologies, responsibility of artificial intelligence

1. Introduction

The cadastral system of Uzbekistan includes more than 20 types of state cadastres, the objects of which are both natural resources and objects of a non-natural nature. This system contains a huge database, on the reliability of which the course of all economic reforms depends. Therefore, the use of artificial intelligence capabilities in working with cadastral information is one of the relevant topics of domestic environmental and cadastral practice.

Analysis of the international rating "Government Artificial Intelligence Rea Dines Index" ("The government's Readiness Index for Artificial Intelligence"), conducted by Oxford Insights, shows that Uzbekistan is making great efforts in the field of introducing artificial intelligence technologies. So, if in 2019 Uzbekistan ranked 158th among 160 countries of the world, then in 2020 it ranked 95th, in 2021 it ranked 93rd and in 2022 it ranked 79th.[1] Thus, the country's position in the field of artificial intelligence has almost doubled in five years. To a greater extent, this is due to the beginning of the use of artificial intelligence in the field of cadastre. The adoption by UNESCO of Recommendations on the ethical aspects of the use of artificial intelligence in

2021, as well as by the European Union of the world's first law "On Artificial Intelligence" at the end of 2023, became an impetus for Uzbekistan to further improve the regulatory framework for the use of artificial intelligence technologies.

The use of artificial intelligence in the national cadastre is still fragmentary, which indicates its latent level. The practical application of artificial intelligence technologies is ahead of its legal regulation and is expressed in the form of 3D, 4D and 5D computer simulations.

In terms of the practical results of the implementation of 3D models in, it should be noted the creation of 3D models for certain types of minerals, envisaged back in 2020 within the framework of the cadastre of deposits, manifestations of minerals and man-made mineral formations. The creation of 3D models of buildings and structures is widely practiced.

Based on the Administrative Regulations for the provision of public services for the provision of information on the history of real estate, according to which a certificate on the history of real estate (buildings) can be obtained directly at the Center of Public Services, or through a Single Portal of Interactive Public Services or on the website davreestr.uz, which is the first 4D cadastre experience.

5D modeling has also been successfully applied to such facilities as industrial enterprises, boiler houses, logistics centers, shopping malls and other complex property complexes. In particular, on the official website of the Cadastre Agency on the website https://kadastr.uz/ru/kadastr-qiymatini-hisoblash A service is provided for calculating the cost of buildings based on a BIM model of the building.

But artificial intelligence does not cover all types of state cadastres and its practical application is not supported by legal regulations.

I. The goals and objectives of the study.

1.1. The state of national legislation. The issue of legal regulation of the use of artificial intelligence in the cadastre is related to the issue of regulating the legal status of artificial intelligence in general.

As for the general issues of legal regulation of the use of artificial intelligence, the following tables provide a detailed analysis of the fundamental directions of legislation.

Table 1. The state of normative activity in the neid of artificial interligence application				
1.	The law "On Artificial Intelligence"	absent		
2.	Artificial Intelligence Development Strategy	absent		
3.	State standards in the field of artificial intelligence application	absent		
4.	Code of Ethics for the Use of Artificial Intelligence	absent		
5.	Special mode of using AI technologies	there is		

Table 1. The state of normative activity in the field of artificial intelligence application

Table 2.	The state	of financing	of national	projects using	artificial	intelligence
1 abic 2.	The state	or maneing	or national	projects using	, ai tiriciai	memzence

Types of financing						
Tools	Grants	Performers'	Loans	International	Tools	Joint Alliance
MFU		Tunus		grants	IPFO	

Higher special education		Postgraduate education		
special	legal	special	legal	
231 quotas for Bachelor's degree,		5 quotas for doctoral studies and		
14 quotas for master's degree in	abcant	independent researchers in the field of	abcant	
Artificial Intelligence in 6	absent	Digital Technologies and Artificial	absent	
universities of the country		Intelligence		

Table 3. The state of education in the field of artificial intelligence

Table 4. Types of information on natural resources provided in the public domain for the implementation of projects in the field of artificial intelligence

1 J	
Climate and weather data	+
Data on the objects of the flora	-
Data on water resources	+
Data on objects of the animal world	-
Data on land resources	+
Data on forest resources	-
Data on protected natural areas	-
Data on minerals	-

Thus, the analysis of the state of legislation made it possible to identify gaps in the legal regulation of the issue of the use of artificial intelligence technologies.

In particular, fundamental and conceptual acts of legal regulation in the field have not yet been adopted, and a special regime for supporting AI technologies has a time frame for use and applies only to residents of IT parks, which, in our opinion, limits the possibilities of other entities involved in this field.

The organizational aspect of management is limited only by the functioning of a public administrative body and a consulting structure, while there is no participation of the private sector in the field of AI management. If we take into account the fact that the largest private companies are the main developers all over the world, then the future of the AI application in Uzbekistan will also be concentrated in the hands of business entities. Therefore, their participation in management should also be regulated.

There is no regulation of the teaching of legal knowledge within the framework of the formation of special knowledge in the field of AI. Despite the fact that TSUL is included in the list of universities that introduce

training courses and subjects on the application of artificial intelligence technologies in the public administration system, training targets (bachelor's, master's and doctoral degrees) in the field of AI have not been developed. Insufficient attention to the development of general scientific activity is sharply manifested against the background of the practical absence of legal scientific activity.

Financing of AI projects is carried out mainly at the expense of extra-budgetary funds, while public financing is present only in a new institution - the Alliance, which is an association of finances of government agencies and business entities.

The composition of data on natural resources that can be used as a data algorithm is also limited. Only open cadastral data on land and water resources are currently used in AI projects, while data on other natural resources are not available.

An analysis of the general norms of legislation shows that there is no regulation of such concepts as "3D plot", "3D property". All available cadastral information is related to the 2D cadastre. The Land Code of the Republic of Uzbekistan states that "a land plot is a part of the land fund having a fixed boundary, area, location, legal regime and other characteristics reflected in the state land cadaster", while the concept of "land fund" is not defined, but only its constituent parts are given.[4] The law "On the State Land Cadastre" does not define a land plot [5]. The Law "On Subsoil" defines the subsoil as a part of the Earth's crust located below the soil layer, and in its absence - below the Earth's surface or the bottom of water bodies, extending to depths accessible for geological study and development, and mining as a subsoil area limited in area and depth.[6] Objects such as bridges, underground facilities, stadiums, utilities, tunnels are partially regulated and are objects of separate cadastres. The Civil Code of the Republic of Uzbekistan by real estate means plots of land, subsoil, buildings, structures, perennial plantings and other property firmly connected with the land, that is, objects whose movement is impossible without disproportionate damage to their purpose [7]. But the concept of "vertical real estate" is not regulated either in the Civil or Urban Planning Codes of the Republic of Uzbekistan [8].

1.2. International norms and their implementation into legislation. The main international norm, the implementation of which in national legislation is considered appropriate is the Recommendations on the ethical aspects of Artificial intelligence (hereinafter referred to as Recommendations), which are the main criteria for the use of AI today. The development of this document began in 2019 and was adopted only in November 2021 by the UN General Conference on Education, Science and Culture (UNESCO). The purpose of the adoption of this document is to regulate the use of AI for peaceful purposes, directing it to serve for the benefit of man, society and the environment.

The following table shows the recommended ethical values and principles of artificial intelligence, which are enshrined in the Recommendation.

VALUES	PRINCIPLES OF OPERATION
respect protection and promotion of human rights and	proportionality and non-harm;
fundamental freedoms and human dignitu	safety and security;
fundamental freedoms and numan digitity,	justice and non-discrimination;
anyironmontal and access tam well being:	stability;
environmental and ecosystem wen-being,	the right to privacy and data protection;
ensuring diversity and inclusivity:	control and subordination to a person;
ensuring diversity and merusivity,	transparency and explicability;
living in pagasful just and interconnected societies:	responsibility and accountability;
nying in peaceful, just and interconnected societies,	awareness and literacy
	multi-stakeholder and adaptive management and
	collaboration

The above guidelines and principles generally comply with the fundamental principles of national cadastral legislation.

Despite the fact that this act is called Recommendations on the ethical aspects of artificial Intelligence, it also contains legal recommendations that, before the adoption of a separate law, can replace the legal norms regulating the use of AI in the countries that implemented it.

In particular, recommendations on legal responsibility, the identification of areas in which artificial intelligence can and cannot be used, the mandatory control of artificial intelligence to humans, etc.

The use of AI in the field of the environment and ecosystems, of which the inventories of natural resources are an integral part, refers to areas requiring strategic measures for the use of artificial intelligence, recommended by the United Nations. There are no norms directly regulating the use of AI in the field of cadastre in national legislation. Comparing the above standards with the provisions of the Recommendations, we found that they lack a number of fundamental requirements, as reflected in the following table.

Missing norms	What is the risk?
the concept of "artificial intelligence" and "life cycle	will lead to the identification of artificial intelligence
of artificial intelligence" is not regulated	with traditional objects of legal relations
minimizing the possible negative consequences of the	, the positive result obtained is devalued, a threat to
use of AI	others
monitoring the activities of AI throughout the entire	is created, will lead to the total domination of
life cycle, including public control	machines over humans
the limits of human responsibility in the application	, violations of human rights and interests when using
And	AI will remain unpunished
guaranteeing the interests of marginalized groups of	
the population, based on digital inequality at the	, will create a limited range of subjects of AI use
domestic level	
The mechanism of compensation for harm caused by	The right to compensation for material and moral
the use of AI technologies	damage will not be realized
The system of "soft" control in the field of AI	The lack of uniform requirements for regulating the
application	activities of AI developers
	The possibility of making claims against AI as an
And And cannot have the status of a legal entity	independent legal entity as a subject of private and
	public law

And so, the analysis shows that the fundamental principles and guidelines in the field of application of AI technologies in the cadastral legislation of Uzbekistan are partially regulated today. It should be noted that some provisions of the Recommendations are already in force in the area of legislation under study.

In particular, the establishment of a transparent system of coordination with private legal entities with socially significant information. There is such a system in the law "On Environmental Audit", according to which the conclusions of an environmental audit are not disclosed without the consent of the customer.

1.3. Best foreign practice. Based on the foreign practice of legal regulation of the use of artificial intelligence in the cadastre, the following trends in the use of 3D cadastre can be identified:

1. the existence of a separate law regulating the application of the 3D cadastre. For example, China has a separate law on 3D cadastre, which, along with land plots in exclusive state ownership, registers buildings and structures;

2. There is no separate law, while amendments and additions have been made to the current legislation regulating the legal status of 3D cadastres. These countries include Australia (Queensland and), Hungary, Sweden, the Netherlands, Poland, Turkey, etc. This system is very flexible by nature, as it is based on the use of land boundaries within a two-dimensional cadastre to generate information on a 3D cadastre object. However, there are disadvantages to this system. Thus, when generating information about one object within the 3D cadastre, information about several land plots within the 2D cadastre is used. This practice may fail in the future when the issue of legal recognition of 3D cadastres arises.;

3. Despite its wide application in practice, the norms of current legislation do not allow the use of a 3D cadastre. In Greece and Cyprus, the use of 3D cadastre is contrary to the Civil Code.

In the famous book Oosterom, devoted to the analysis of the best practice of using 3D cadastre in the world, a separate chapter is devoted to the legal basis for the use of artificial intelligence.[9]

The first homeland of the introduction of artificial intelligence in the field of cadastre is Australia. In 1997, Australia was one of the first countries in the world to introduce 3D modeling in the field of real estate cadastre. Therefore, the information of the 3D cadastre has equal force on a par with 2D and 4D cadastral information. Paper cadastral information works in parallel with electronic information, while the first one has too much detail, whereas 3D is a simple graphic image. Thus, paper and digital cadastral information complement each other. All types of property rights can be registered in both 3D and 2D cadastres. In addition, three-dimensional modeling objects are singled out separately: bridges, underground spaces, parking easements, lease agreements, engineering networks, pipelines, stadiums, etc. A 3D plot can be an object of collateral, just like a regular plot, despite the fact that 3D cadastral information is not the last truth in the cadastre.

The legislation of Argentina does not regulate the legal status of the 3D cadastre, despite its wide application in

practice. In Austria, no matter how much they tried to completely switch to a 3D cadastre, the digitalization of the cadastre has not been fully completed. In Bulgaria, there is a partial application of 3D modeling, so if in Sofia a three-dimensional cadastre is considered necessary, and in other cities of the country it is not the main source of information. At the same time, the legislation does not regulate its legal status. The Canadian cadastre is distinguished by the daily updating of cadastral maps, books, reports, although in fact it is a multi-purpose cadastre, while there is no separate law on 3D cadastre, but the objects of the three-dimensional cadastre are separately regulated.

1.4. Uzbek experience in the use of artificial intelligence.

The absence of a law on the use of artificial intelligence in Uzbekistan is being made up for by limited legal regulation- A special regime for the support of artificial intelligence technologies and the procedure for its activities, which means the procedure for legal regulation of testing based on artificial intelligence technology, the creation of organizational and legal conditions for legal entities and scientific organizations, the creation of favorable conditions in legal relations during the implementation of activities related to the development of software and the provision of services, testing of software and their implementation in the framework of "smart" regulation. [10] This mode is a separate link in the Technological Park of Software Products and information Technologies.

The working body of the Special Regime is the Ministry of Information Technology and Communications Development of the Republic of Uzbekistan. The tasks of the working body include

approves the application form and the list of necessary information submitted by applicants for the status of a participant in the special regime, and organizes the acceptance of applications;

approves the charter of the Expert Council of the special regime, as well as the form of an agreement on the conditions of activity concluded with its participants;

forms and approves the composition of the Expert Council of the special regime together with the ministries and departments concerned;

Submits proposals for the inclusion and exclusion of criminals from the special regime to the Coordination Commission for consideration;

attracts employees of the Research Institute for the Development of Digital Technologies and Artificial Intelligence to monitor the scientific activities of participants in the special regime;

provides organizational, legal and advisory support during the implementation of pilot projects of special regime participants;

based on the conclusion of the Coordination Commission, it decides on granting, refusing to grant or depriving the initiators of the project of the status of a participant in a special regime;

submits an annual official report to the relevant ministries and departments on the projects successfully implemented by the participants of the special regime;

Uzbekistan maintains a special Unified Register of participants in the special regime, which contains publicly available and open information about legal entities and scientific organizations that are participants in the Special Regime -residents of IT parks. To become a member of the special regime, you should submit an application to the Coordination Commission.

The legal status of participants in the Special Regime is very specific, since the Regulation regulates only their duties. And the rights of the participants are fixed in a bilateral agreement between the Coordinating

Commission and the participant.

The Regulation provides great preferences and benefits to participants of the Special Regime.

In particular, funds spent on professional development and retraining of personnel are compensated, the right to receive information and documents necessary for the implementation of pilot projects is granted (with the exception of information containing state secrets and other confidential information protected by law), as well as personal information from ministries, departments and organizations, a list of documents necessary to obtain relevant documents of a permissive nature, is reduced by the relevant authorized state body, as well as the amount of the fee, the fee for obtaining the relevant documents of a permissive nature is reduced by 2 times, a minimum of requirements and conditions for carrying out activities on the part of the competent state body is established.

At the same time, the Regulation establishes seven grounds for revoking the status of a participant in the Special Regime (for example, non-fulfillment of contractual relations with a working body, recognition of a legal entity as bankrupt, provision of false information, inconsistency of the activities of a participant in the special regime with the types of activities specified in the draft). At the same time, this list is not exhaustive, the legislator leaves other grounds provided for by law.

However, this Provision cannot be called ideal, as it contains a number of provisions that contradict the law:

firstly, the refusal to register a participant in a special regime in the case of taxes and other mandatory payments is contrary to the legislation on entrepreneurial activity;

Secondly, the absence of a final list of grounds for revoking the status of a participant in a Special regime creates a foundation for corruption;

Thirdly, the functioning of the regime for issuing opinions on the issue of obtaining the status of a participant in the Special Regime is not transparent.

2. Literature review

There is no unified approach to the definition of AI in the scientific literature.

So, domestic scientists Gulyamov S., Rustambekov I. AI is defined as a major area of scientific and applied research.[11] Andreas Kaplan and Michael Henlein write that artificial intelligence is "the ability of a system to correctly interpret external data, learn from such data and use the knowledge gained to achieve specific goals and objectives through flexible adaptation."[12] Daniel Castro and Joshua New, emphasizing the lack of a unified approach to the definition of AI, justify this by dividing existing AI into weak (automated systems) and strong (capable of performing cognitive functions)[13]. Elaine Rich and Kevin Knight define AI as a kind of science that teaches computers to perform human functions that give them superiority over them."[14] Ronal Chandra and Yoga famously single out AI as a type of intelligent computer programs.[15]

An important part of the issue of using artificial intelligence is the issue of responsibility. In this regard, the position of the domestic researcher S.S. Bozarov seems interesting, who, having considered such approaches to establishing legal liability in relation to artificial intelligence as equating artificial intelligence objects with legal entities or objects of increased public danger, suggests as a solution the need to establish proprietary (limited) rights to AI.[16]

EU scientists have studied the issues of the use of artificial intelligence in the cadastre in the form of 3D and 4D inventories in a fairly comprehensive manner.

In particular, Williamson And. he justified the need to switch to a three-dimensional cadastre[17], Oosterom R. in his study revealed the advantages of a 3D cadastre over two-dimensional cadastres, highlighting its main and additional functions[18], S.Hendreitingsin et al. propose a hybrid version of a three-dimensional cadastre combining the basic provisions of a two-dimensional cadastre with three-dimensional modeling[19], Mohamed El-Mekey and others . The main advantages of the 3D cadastre are highlighted[20] and others.

A separate issue is the study of the legal regulation of the use of 3D cadastre data as an object of artificial intelligence. Given the existence of different practices, there is still no single approach to this issue.

In particular, the first group of scientists proposes to regulate the use of AI in the form of a 3D cadastre object concept, a separate regulatory act, as well as in the form of systematization of norms related to the use of AI.[21]

The second group puts forward the idea of restrictive regulation[22], the fourth group of scientists considers the legal status of the 3D cadastre as a result of the interaction of public and private law[23], the fifth group of scientists puts forward the position of common property law[24], etc.

The most prominent proponents of the legal regulation of the use of the 3D cadastre by Van Oster, P. Stoter, J.Ploger, H. Thompson, R.Karkey justify the proposal on the need to recognize the 3D cadastre as an independent right along with such powers as to own, use and dispose.[25]¹

In particular, Fatih Doner et al. consider the problems of registering engineering networks in the cadastre in a four-dimensional dimension using the example of the legislation of three countries in terms of legal, organizational and technical cadastral requirements based on a prototype from the Netherlands and substantiates its prospects.[26]

Toad Zevenbergen et al. in the format of an integrated approach from the perspective of geodesy, computer science, economics and law, the prospects of using the 4D cadastre in the further development of the real estate market are considered.[27]

Peter Van Osterum et al., justifying the advantages of 4D cadastre on the Australian and Dutch experience, analyzes the legal aspects of registration of temporary land ownership rights within the framework of Eigentum, droit de propriété as well as guarantees of their security, the consequences of selling real estate simultaneously to several persons, the actions of the timeline of the timeshare cadastre object based on the requirements of the Queensland Code.[28]

Rybkina A.M. et al. justifying the need for the introduction of three-dimensional modeling of real estate in time, he concludes that the introduction of a 4D cadastre will significantly expand the capabilities of the Unified State Register.[29]

3. The main problem.

3.1. Does the national cadastre need artificial intelligence? Contributing and hindering factors

The advantages of artificial intelligence over traditional technologies in the field of cadastre do not require proof, they are obvious.

The current stage of economic reforms dictates the need to switch to the use of more complex AI systems (for example, neural networks) in the national cadastre for the reason that the developed domestic 2D cadastral model does not meet the need for a digital "green" economy, which is being formed in Uzbekistan.

The factors contributing to the use of artificial intelligence in inventories include:

Firstly, modern national inventories of natural resources represent geographic information systems due to the full-fledged use of GIS technologies. An electronic map of land plots has been created on their basis;

Secondly, in 2017, Uzbekistan switched to international standards in the field of geodesy - the Unified Spatial Data System (WGS-84), which is a global reference system linked to the Earth, including the Earth model and is determined by a set of basic and auxiliary parameters. Previously, Uzbekistan used the 1942 Coordinate System (SK-42), inherited from the socialist economic system, which allows us to obtain data on objects with an error of 2 cm;

Thirdly, there is an intensive growth of urbanization in the country, including the expansion of urban areas with complex infrastructure, the construction of high-rise buildings and underground facilities (tunnels, underground networks and infrastructure facilities), dense buildings with complex structures and "point" buildings. According to statistics, as of July 1, 2023, the number of registered construction companies in Uzbekistan reached 51.64 thousand. At the same time, the growth rate increased by 108.4% compared to the same period in 2022.[30] All this is happening against the background of limited land settlements and the growth of demographic processes, increasing the demand for real estate. In particular, article 42 of the Housing Code of the Republic of Uzbekistan established a social norm of housing per person of at least 16 sq2 meters, and for wheelchair users - at least 23 sq2 meters [31]. According to forecasts, the country's population will grow to 40 million by 2030[32], whereas currently this figure is about 37 million people. This means that the need for housing will only grow, therefore, land plots of other categories will be "involved" in the process by changing the categories of land plots, which, in turn, will affect the reliability of the entire land fund.

At the same time, it is possible to identify a number of hindering factors that significantly slow down the introduction of artificial intelligence technologies. Let's focus on some of them.

firstly, incomplete formation of inventories of natural resources. In particular, in 2023, the legal status of 460 thousand hectares of land, more than 900 thousand hectares of agricultural land, as well as land along canals and reservoirs, near natural lakes and rivers were not included in the cadastre.[33] Given that artificial intelligence processes those data algorithms that were set by humans, with incomplete algorithms prepared the content will also be incomplete. Therefore, the result presented by artificial intelligence will be unreliable. The question arises of the expediency of using artificial intelligence in such conditions. That's why the completeness of the cadastre should be the main condition for the use of artificial intelligence;

secondly, the old technological base does not meet the needs of the digital economy. At a time when there is a worldwide trend of abandoning cadastral mapping, we are still using such technologies for collecting cadastral information as topographical and geodetic, cartographic, soil science, agrochemical and geobotanical studies. Uzbekistan still does not have its own space surveillance satellite, but is limited to renting foreign ones. The main shifts in this direction began last year, in particular, Matrice 600 drones, various software were purchased, funds were allocated to upgrade existing drones, aircraft for aerial photography were purchased, and 80 satellite surveillance stations are planned to be purchased this year. But this is not enough to form a complete and reliable cadastre.;

Thirdly, Uzbekistan did not participate in the Cadastr-2014 cadastral project and does not participate in the Cadastr-2034 project, which directly provides for the use of artificial intelligence AI in the field of cadastre in the form of 3D and 4D cadastre;

Fourth, the lack of regulation of the mechanism for the formation of legal knowledge in the field of artificial intelligence technologies. To date, five higher educational institutions in the country (Tashkent University of Information Technology named after Muhammad al-Khorazmiy, Mirzo Ulugbek National University of Uzbekistan, Tashkent State Technical University named after Islam Karimov, Samarkand State University named after Sharaf Rashidov, Scientific Research Institute for the Development of Digital Technologies and Artificial Intelligence) train specialists in the field of "Artificial Intelligence", but the issue of training specialists in the field of legal regulation of the use of artificial intelligence has not yet been considered. At the same time, Tashkent State Law University, which is a basic educational institution in the field of jurisprudence, is included in the list of institutions that teach disciplines in the field of artificial intelligence AI in the field of

public administration[34], while training specialists in the field of legal regulation of the use of artificial intelligence has not yet been established;

Fifth, the unsatisfactory state of scientific activity. To date, there is no scientific research in the country in the field of legal regulation of activities using AI in the cadastral sphere. Recognizing the fact that Uzbekistan today does not belong to countries with a high level of development of artificial intelligence technologies, at the same time, the use of artificial intelligence is quite in demand in the field of cadastre. This, in turn, requires an active and in-depth study of the legal problems of regulating the use of AI in the cadastre in parallel with the training of specialists;

Sixth, the passive participation of the state in financing projects in the field of AI applications. To date, financing of AI projects is carried out mainly at the expense of non-governmental funds (developer's funds), or in the form of combining the capital of large state-owned business entities with business (Alliance);

Seventh, the lack of implementation of international standards in the field. The Founding Act - UNESCO Recommendations on the Ethical Aspects of the Use of Artificial intelligence, adopted in 2021, have not yet been implemented.

3.2. What will artificial intelligence give to the national cadastre?

In our opinion, the use of artificial intelligence in the field of cadastre will help solve a number of accumulated problems.

Firstly, it will allow to raise the national cadastre to the international level. In all developed countries, as well as in many numerous developing countries, the cadastre is the main source of information in ensuring the inviolability of private property. This norm is also contained in Article 65 of the updated constitution of the New Uzbekistan [35], while cadastral information is provided through the formation of reliable information, which in foreign countries is provided primarily by the cadastre;

Secondly, it will increase the prestige of the cadastre as the main reliable legal source of guarantees of ownership of real estate. In foreign countries, the prestige of the cadastre is high due to its reliability and accuracy, which cannot be said about the national one, which is not fully formed even at the threshold of the second quarter of the 21st century;

Thirdly, it will significantly reduce the level of corruption and the possibility of making "cadastral" errors due to the exclusion of the human factor in the formation and provision of cadastral information;

Fourth, it will significantly reduce the decision-making time. The introduction of AI technologies will allow you to quickly and efficiently process and update large cadastral data, which will make it possible to receive and change information online. In addition, this will avoid unreasonable costs for inefficient technical means of collecting and processing cadastral information and significantly reduce the time needed to generate the necessary content.;

Thus, the introduction of artificial intelligence in the field of cadastre will contribute to obtaining reliable data and results in the presence of a complete and reliable information base and will contribute to increasing the prestige of the cadastre.

3.3. The results of the study.

The use of artificial intelligence as the next stage of information automation can be imagined as the future of the entire national cadastral system.

On the agenda in Uzbekistan is the issue of developing a Strategy for the development of artificial intelligence, which was supposed to be adopted back in 2022. This act should contain a state program to support scientific research and innovative projects in the field of artificial intelligence, the formation of a large amount of digital data in the state language, the creation of modern high-tech infrastructure and hardware complexes for solving artificial intelligence problems, training, as well as improving the system of control and prevention of risks in the field of artificial intelligence.

At the same time, we consider it advisable to include in this document such issues as:

1. basic theoretical concepts (including the concepts of "artificial intelligence", "life cycle of artificial intelligence");

2. The legal status of artificial intelligence. Today, in our opinion. It is too early to talk about artificial intelligence as an independent object or subject of national law. It is advisable to consider the joint responsibility of the developer of artificial intelligence and the owner of algorithms;

3. The obligation to license activities using artificial intelligence. Currently, the Coordination Commission is giving an opinion on the results of studying the submitted documents of applicants for IT park participants;

4. development of a system of ethical principles for the use of AI in accordance with international and constitutional norms

legislative consolidation of a certain limit of mandatory financial state support for the use of AI in the field of cadastre. Direct financing from the state budget of this area, in our opinion, would clearly express the direct interest of the state in the widespread use of AI. Currently, the state supports this area by providing benefits and preferences, free use of buildings, compensation for training costs, etc.;

In pursuance of paragraph 3.19 of the Program of Measures for the Study and Implementation of Artificial Intelligence Technologies in 2021-2022[17], which provides for the development of joint international research activities aimed at the development of AI, it is proposed to include Melbrunsky University (Australia), which is an advanced university in the world in the field of cadastre, in the list of foreign research and higher educational institutions in the field of cadastre. in the field of studying issues of legal regulation of the introduction of 3D, 4D and 5D cadastres in the field of cadastre;

It is proposed to consider the issue of Uzbekistan's joining the global project - Cadastr-2034. This will allow us to form a systematic approach to the use of AI by forming 3D, 4D and 5D inventories.

4. Conclusion

Artificial intelligence is needed like air for the national cadastre. Currently, we are seeing attempts to adapt the old cadastre to the needs of the new economy - the digital "green" economy, which needs reliable information about the state of natural resources. The reform of the management of the national cadastre, expressed in the creation of a special body - the Cadastre Agency, was a turning point for the national cadastre in terms of updating the technological base of cadastral activities. Uzbekistan has already formed a certain basis for the use of artificial intelligence, manifested in the functioning of geographical information systems, digital electronic maps and also systems for the assessment of cadastre objects. A promising area for the national cadastre is the use of artificial intelligence in the registration of real estate rights as well as in the recognition of documents. Nevertheless, the practical application of artificial intelligence in the cadastre is an official source of cadastral information.

5. References

- 1. <u>https://uza.uz/ru/posts/cifrovizaciya-uzbekistan-podnimaetsya-vverx-v-mezhdunarodnyx-reytingax 440081</u>
- 2. Земельный Кодекс Республики Узбекистан https://lex.uz/docs/149947
- 3. Закон Республики Узбекистан "О государственном земельном кадастре" <u>https://lex.uz/docs/9704</u>
- 4. Закон Республики Узбекистан "О недрах" <u>https://lex.uz/docs/77646</u>
- 5. Гражданский Кодекс Республики Узбекистан https://lex.uz/docs/111181
- 6. Градостроительный Кодекс Республики Узбекистан https://lex.uz/docs/5307955
- 7. Best Practices 3D Cadastres. Editor van Oosterom. Copengagen, 2018.P. 65
- 8. Постановлением Кабинета Министров Республики Узбекистан «Об утверждении положения об организации специального режима поддержки технологий искусственного интеллекта и порядка его деятельности» от 29 ноября 2021 года №-717 https://lex.uz/docs/5746496
- 9. https://stat.uz/ru/press-tsentr/novosti-goskomstata/41727-so-nggi-yillarda-qurilis-h-sohasida-korxonalarsoni-qanchaga-ko-paydi-4
- 10. Жилищный кодекс Республики Узбекистан <u>https://lex.uz/docs/106134</u>
- 11. Гулямов С., Рустамбеков И. Искусственный интеллект современное требование в развитии общества и государства. Газета «Правда Востока», № 43 (29547) 2 марта 2021 года
- 12. On the interpretations, illustrations, and implications of artificial intelligence. Andreas Kaplan, Michael Haenlein. https://www.sciencedirect.com/science/article/abs/pii/S0007681318301393.
- 13. Castro D., New J. The Promise of Artificial Intelligence / Center for data innovation // http://www2.datainnovation.org/2016-promise-of-ai.pdf>. 2016. 44 p. P. 3.
- 14. Rich E., Knight K. Artificial Intelligence. Second edition. New York: McGraw-Hill, 1991.
- 15. Chandra R., Prihastomo Y. Artificial Intelligence Definition: A Review //https://pdfs.semanticscholar.org/d959/ad041acca7570a7229e51c18 a297bb7ca0b2.pdf>. 3 p. P. 1.
- 16. Бозаров С. С. Правовая ответственность в рамках искусственного интеллекта. Автореферат дис. на соиск.учен.степени докт.фил.наук. Т., ТГЮУ, 2023, с. 16; Бозаров С. К вопросу об этических и правовых основах ответственности искусственного интеллекта // Журнал правовых исследований, 2021, 8 том, 1 1 выпуск, с. 19-27
- 17. Williamson, I. P., 1997, Strategic Management of Cadastral Reform Institutional Issues, FIG Commission 7 Symposium on Cadastral Systems in Developing Countries, Penang, Malaysia.

- Oosterom, P. Best Practices 3D Cadastres/ Extended version [Электронный ресурс]. /P. Oosterom //Delft, Netherlands,2018, <u>http://www.gdmc.nl/,3D</u> Cadastre/ The Theory of Evolution BIM 3D-7D. URL httrs//bimestimate.eu/en/the-theory-of-evolution-bim-3d-7d
- 19. S. HENDRIATININGSIHS. Irawan SOEMARTO, Bambang Edhie LAKSONO, Iwan KURNIAWAN, Novi Kristina DEWI and Nanin SOEGITO, Identification of 3-Dimensional Cadastre Model for Indonesian Purpose Strategic Integration of Surveying Services FIG Working Week 2007 Hong Kong SAR, China, 13-17 May 2007 file:///C:/Users/Honor/Downloads/Identification_of_3Dimensional_Cadastre% 20(1).pdf
- 20. Mohamed El- Mekawy, Jesper Paasch, Jenny Paulsson Integration of 3D Cadastre, 3D Property Formation and BIM in Sweden // 4th International Workshop on 3D Cadastres. 9-11 November 2014. Dubai, United Arab Emirates. P. 17-34.
- 21. Stoter, J. and Zevenbergen, J. 2001. Changes in the definition of property: A consideration for a 3D cadastral registration system. Proceedings of the FIG Working Week, Seoul, 2001. Accessed on 10 January 2013 at http://www.gdmc.nl/3DCadastres/literature/3Dcad_2001_01.pdf. Fendel, E. M. 2002. Registration of Properties in Strata: report on the Working Sessions. Digital report, accessed on 10 January 2013 at http://www.gdmc.nl/3DCadastres/literature/3Dcad_2001_05.pdf.; Karki, S., Thompson, R., McDougall, K., Cumerford, N. and van Oosterom, P. 2010. ISO land administration domain model and LandXML in the development of digital survey plan lodgement for 3D cadastre in Australia. Proceedings of the 2nd International Workshop on 3D Cadastres (pp. 65-84), 16-18 November 2011. Delft: TU Delft.
- 22. Sandberg, H. 2001. Three-dimensional division and registration of title to land: Legal aspects. Proceedings of the International Workshop on 3D Cadastres, 2001, Delft, pp. 201-209.; Stoter, J. and Ploeger, H. 2003. Registration of 3D objects crossing parcel boundaries. Proceedings of 2003 FIG Working Week, Paris, France, April 13-17, 2003.; Tan, L. C. and Hussin, K. B. 2012. Establishing 3D Property Rights in Malaysia. Proceedings of the 2012 FIG Working Week, Knowing To Manage The Territory, Protect The Environment, Evaluate The Cultural Heritage, Rome, Italy, 6-10 May 2012. Retrieved from http://www.gdmc.nl/3DCadastres/literature/3Dcad 2012 03.pdf on 14 Jan 2013.
- Navratil, G. 2012. Combining 3D cadastre and public law an Austrian perspective. In P. Van Oosterom, R. Guo, L. Li, S. Ying and S. Angsüsser (eds.), Proceedings of the 3rd International Workshop on 3D Cadastres pp. 61-71, 25-26 October, Shenzhen, China 2012. Copenhagen, Denmark: International Federation of Surveyors.
- 24. Paulsson, J. 2012. Swedish 3D property in an international comparison. In P. Van Oosterom, R. Guo, L. Li, S. Ying and S. Angsüsser (eds.), Proceedings of the 3rd International Workshop on 3D Cadastres, Developments and Practices (pp. 23-40), 25-26 October 2012, Shenzhen, China. Copenhagen, Denmark: International Federation of Surveyors
- 25. Van Oosterom, P., Stoter, J., Ploeger, H., Thompson, R. and Karki, S. 2011. World-wide inventory of the status of 3D Cadastres in 2010 and expectations for 2014. Proceedings of the 2011 FIG Working Week, Bridging the Gap between Cultures, Marrakech, Morocco, 18-22 May 2011.
- 26. Fatih Do[•]nera, Rod Thompsonb,d, Jantien Stoterd,e, Christiaan Lemmenc,e, Hendrik Ploegerd,f, Peter van Oosteromd and Sisi Zlatanovad. Solutions for 4D cadastre with a case study on utility networks. DOI: 10.1080/13658816.2010.520272 http://www.informaworld.com
- 27. Jaap Zevenbergen Andrew Frank Erik Stubkjær .<u>Erik Stubkjær</u>. Real property transactions. Procedures, transaction costs and models. Copyright 2007 by COST Office:/Users/Honor/Downloads/6_A_socio_technical_analysis_of_cadastra%20(5).pdf
- 28. <u>Peter VAN OOSTEROM, Hendrik PLOEGER and Jantien STOTER, Rod THOMPSON, Christiaan LEMMEN. Aspects of a 4D Cadastre: a first exploration. Shaping the Change XXIII FIG Congress Munich, Germany, October 8-13, 2006 ///C:/Users/Honor/Downloads/Aspects_of_a_4D_Cadastre_A_First_Explora.pdf</u>
- 29. Рыбкина А. М. Применение 4d-моделирования для целей государственного кадастрового учета file:///C:/Users/Honor/Downloads/primenenie-4d-modelirovaniya-dlya-tseley-gosudarstvennogo-kadastrovogo-ucheta%20(2).pdf
- 30. https://daryo.uz/ru/2023/11/09/v-blizajsie-gody-cislennost-naselenia-uzbekistana-dostignet-40-mln-celovek
- 31. https://president.uz/ru/lists/view/6878
- 32. Постановление Президента Республики Узбекистан «О мерах по созданию условий для ускоренного внедрения технологий искусственного интеллекта» от 17 февраля 2021 г., № ПП-4996 https://lex.uz/docs/5297051

33. Конституция Республик Узбекистан https://lex.uz/docs/6445147