IRSTI 06.61.01
UDC 332.363 https://www.jpra-kazniiapk.kz
Research Article https://doi.org/10.46666/2025-4.2708-9991.21

LAND CADASTRAL WORKS IN THE REPUBLIC OF KAZAKHSTAN: ACCOUNTING AND IDENTIFICATION OF PATTERNS

ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ ЖЕР-КАДАСТРЛЫҚ ЖҰМЫСТАР: ЕСЕПКЕ АЛУ, ЗАҢДЫЛЫҚТАРДЫ АНЫҚТАУ

ЗЕМЕЛЬНО-КАДАСТРОВЫЕ РАБОТЫ В РЕСПУБЛИКЕ КАЗАХСТАН: УЧЕТНОСТЬ, ОПРЕДЕЛЕНИЕ ЗАКОНОМЕРНОСТЕЙ

A. ZHEKEBAEV*
Ph.D student
[1]S.Seifullin Kazakh Agro Technical Research University, Astana, Kazakhstan
**corresponding author e-mail: altynbek.alem@inbox.ru*
А. ЖЕКЕБАЕВ*
Ph.D докторанты
[1]С.Сейфуллин атындағы Қазақ агротехникалық зерттеу университеті, Астана, Қазақстан
**автордың электрондық поштасы: altynbek.alem@inbox.ru*
А. ЖЕКЕБАЕВ*
докторант Ph.D
[1] Казахский агротехнический исследовательский университет им. С.Сейфуллина, Астана, Казахстан
[*]электронная почта автора: altynbek.alem@inbox.ru

Abstract. Land cadastral accounting in the Republic of Kazakhstan is a strategic direction of state land policy aimed at ensuring rational use, protection, and restoration of land resources, development of the digital economy, and improvement of transparency in property relations. The *purpose* is to identify priorities for modernizing the national cadastral system based on the study of international experience, modern technologies, and legal requirements, as well as to determine prospects for introducing innovative mechanisms for land fund management. *Methods* — monographic, analytical, and expert methods provided a comprehensive approach to examining land ownership objects, analyzing factors affecting their functionality, and outlining trajectories of digital transformation. A comparative analysis of foreign cadastral models of France, Spain, and Germany was conducted, and the possibilities of adapting their elements in Kazakhstan were shown. Special attention is given to the role of the Unified State Real Estate Cadastre (USREC) as a key component of digital infrastructure in land relations and public administration. The possibilities of applying international standards ISO 19152 Land Administration Domain Model (LADM) and the European initiative Infrastructure for Spatial Information in Europe (INSPIE), ensuring spatial data compatibility, unification of cadastral processes, and optimization of geoinformation quality, are presented. *Results* — it is noted that effective maintenance of the cadastral register largely depends on the level of digitalization, interagency integration, accuracy of cartographic data, and legal protection. *Conclusions* — further improvement of the cadastral structure requires technical modernization, an effective regulatory framework, expansion of digital services, introduction of artificial intelligence and blockchain technologies, improvement of specialist qualifications, and formation of a culture of responsible land use. The practical significance of the study lies in the development of scientifically grounded methodological approaches and recommendations for optimizing the functioning of cadastral accounting in the republic.

Аңдатпа. Қазақстан Республикасындағы жерді кадастрлық есепке алу-жер ресурстарын ұтымды пайдалануды, қорғауды және қалпына келтіруді қамтамасыз етуге, цифрлық экономиканы дамытуға және мүліктік қатынастардың ашықтығын жақсартуға бағытталған мемлекеттік жер саясатының стратегиялық бағыты. *Мақсаты* - халықаралық тәжірибені, заманауи технологиялар мен құқықтық талаптарды зерделеу негізінде ұлттық кадастрлық жүйені жаңғыртудың басымдықтарын айқындау, сондай-ақ жер қорын басқарудың инновациялық тетіктерін енгізу перспективаларын айқындау. *Әдістері* – жер меншігі объектілерін қарауға, олардың функционалдығына әсер ететін факторларды талдауға және цифрлық трансформация траектория-

ларын белгілеуге кешенді тәсілді қамтамасыз еткен монографиялық, талдамалық, сараптамалық. Франция, Испания және Германияның шетелдік кадастрлық модельдеріне салыстырмалы талдау жүргізілді, олардың элементтерін Қазақстанға бейімдеу мүмкіндіктері көрсетілді. Жер қатынастары және мемлекеттік басқару саласындағы цифрлық инфрақұрылымның негізгі құрамдас бөлігі ретінде жылжымайтын мүліктің бірыңғай мемлекеттік кадастрының (МБМК) рөліне ерекше назар аударылды. ISO 19152 land Administration Domain Model (LADM) және еуропалық Infrastructure for Spatial Information in Europe (INSPIE) бастамаларының кеңістіктік деректердің үйлесімділігін, кадастрлық процестерді біріздендіруді және геоақпарат сапасын оңтайландыруды қамтамасыз ететін халықаралық стандарттарын қолдану мүмкіндіктері ұсынылған. *Нәтижелер* – кадастрлық тізілімді нәтижелі жүргізу көбінесе цифрландыру деңгейіне, ведомствоаралық интеграцияға, картографиялық мәліметтердің дәлдігіне және құқықтық қорғалуына байланысты. *Қорытындылар* - кадастрлық құрылымды одан әрі жетілдіру техникалық жаңартуды, пәрменді нормативтік-құқықтық базаны, цифрлық сервистерді кеңейтуді, жасанды интеллект пен блокчейн-технологияларды енгізуді, мамандардың біліктілігін арттыруды және жауапты жер пайдалану мәдениетін қалыптастыруды талап етеді. Зерттеудің практикалық маңыздылығы республикада кадастрлық есептің жұмыс істеуін оңтайландыру бойынша ғылыми негізделген әдістемелік тәсілдер мен ұсынымдарды әзірлеу болып табылады.

Аннотация. Кадастровый учет земель в Республике Казахстан – стратегическое направление государственной земельной политики, ориентированное на обеспечение рационального использования, охраны и восстановления земельных ресурсов, развитие цифровой экономики и улучшения прозрачности имущественных отношений. *Цель* - определение приоритетов модернизации национальной кадастровой системы на основе изучения международного опыта, современных технологий и правовых требований, а также выявление перспектив внедрения инновационных механизмов управления земельным фондом. *Методы* – монографический, аналитический, экспертный, обеспечившие комплексный подход к рассмотрению объектов земельной собственности, анализу факторов, влияющих на их функциональность, и обозначению траекторий цифровой трансформации. Проведён сравнительный анализ зарубежных кадастровых моделей Франции, Испании и Германии, показаны возможности адаптации их элементов в Казахстане. Особое внимание уделено роли Единого государственного кадастра недвижимости (ЕГКН) как ключевой составляющей цифровой инфраструктуры в сфере земельных отношений и государственного управления. Представлены возможности применения международных стандартов ISO 19152 Land Administration Domain Model (LADM) и европейской инициативы Infrastructure for Spatial Information in Europe (INSPIE), обеспечивающих совместимость пространственных данных, унификацию кадастровых процессов и оптимизация качества геоинформации. *Результаты* – отмечается, что результативное ведение кадастрового реестра во многом зависит от уровня цифровизации, межведомственной интеграции, точности картографических сведений и правовой защищённости. *Выводы* - дальнейшее совершенствование кадастровой структуры требует технического обновления, действенной нормативно-правовой базы, расширения цифровых сервисов, внедрения искусственного интеллекта и блокчейн-технологий, повышения квалификации специалистов и формирования культуры ответственного землепользования. Практическая значимость исследования заключается в разработке научно обоснованных методических подходов и рекомендаций по оптимизации функционирования кадастрового учета в республике.

Keywords: agrarian sector, land cadastre, cadastral accounting, digitalization, geoinformation systems, Unified State Real Estate Cadastre, spatial data, land rights registration.

Түйінді сөздер: аграрлық сектор, жер кадастры, кадастрлық есеп, цифрландыру, геоақпараттық жүйелер, жылжымайтын мүліктің бірыңғай мемлекеттік кадастры, кеңістіктік деректер, жерге құқықтарды тіркеу.

Ключевые слова: аграрный сектор, земельный кадастр, кадастровый учёт, цифровизация, геоинформационные системы, Единый государственный кадастр недвижимости, пространственные данные, регистрация прав на землю.

Received: 11.11.2025. Approved after Peer-reviewed: 06.12.2025. Accepted: 12.12.2025.

Introduction

The establishment of cadastral registration in the Republic of Kazakhstan took place in stages and was accompanied by a change in its functions in accordance with the priorities of the state land policy. At different stages of development, the cadastral registration system performed both technical and managerial

tasks, gradually acquiring strategic importance in regulating property and land relations. Cadastral registration, which is a system of information about land plots and real estate objects, is an integral part of Kazakhstan's economic development and transition to market relations. In foreign countries, the development of cadastral registration is also closely linked to the evolution of market mechanisms and digital technologies. Transactions of purchase and sale, transfer, possession and inheritance of rights to land plots have become the main factor in the formation of modern cadastral systems focused on ensuring the legal reliability and transparency of property relations.

The special relevance of this study was emphasized by the Head of State in the need for large-scale implementation of digital technologies and artificial intelligence in all areas of public administration. In particular, this concerns the land management system. It was noted that, digitalization and intelligent technologies should become a tool for improving the efficiency of the state apparatus, transparency of processes and openness of data for citizens and businesses (President K.-J. Tokayev's State …) [1].

In this context, the improvement of cadastral land accounting is of strategic importance, since it is the cadastre that acts as the basic element of the digital infrastructure that ensures the rational use of land resources and the development of spatial services. The development of the Unified State Real Estate Cadastre (USREC), the integration of spatial data, the introduction of artificial intelligence and automated analysis systems fully comply with the tasks outlined in the President's Address and serve as the basis for the digital transformation of the land cadastre sector in Kazakhstan.

As a result, the Unified State Real Estate Cadastre has been established and is currently operating in the republic, which is a key area of digital transformation of the land cadastre sector in Kazakhstan. Reliable and structured data on land plots and real estate objects are a key element of information support for public administration, contributing to the rational use of land resources, improving the efficiency of spatial planning and the sustainable development of the country's economy.

Literature review

In recent years, there has been a growing interest in improving cadastral systems in the context of digitalization and the transition to spatial data-based land management. The modern cadastre is becoming a tool for sustainable development, digital management and spatial planning. An effective system should integrate land, property and legal accounting through geoinformation technologies and the unification of data standards. The growing role of artificial intelligence, cloud computing, and big data analytics in land administration emphasizes the need for intelligent, automated solutions that can ensure accuracy and accessibility of cadastral information. Integration of remote sensing and satellite monitoring technologies also enables real-time tracking of land use changes and supports evidence-based policy-making in land management.

Noardo F., Ellul C., Harrie L. et al. [2] present the concept of Geographic Building Information Modeling (GeoBIM) - combining cadastral and BIM models to improve accounting accuracy and optimize urban planning solutions. For Kazakhstan, this is the way to create a "smart cadastre".

Sladic G., Milosavljevic B., Nikolic S.et.al., [3] explore the use of blockchain in cadastral systems, ensuring security, transparency and trust in data. Thebault M., Clivillé V., Berrah L. et al. [4] show the use of cadastral data to assess infrastructure and sustainable development, which in Kazakhstan can contribute to "green" land use. Bennett R., Miller T., Pickering M. et al. [5] are considering smart contracts that automate the registration of rights and transfer of ownership. A hybrid blockchain architecture can become the basis of an intelligent cadastre.

Oukes P., Andel M., Folmer E. et al. [6] apply Domain-Driven Design (DDD) when updating Kadaster, increasing flexibility and transparency. This is important for Kazakhstan when modernizing the Unified State Real Estate Cadastre and introducing the ISO 19152 Land Administration Domain Model (LADM) standard. Lemmen C., van Oosterom P., Bennett R. [7] note that LADM ensures the unification of cadastral and registration data and reduces management costs. Matuk O., Całka B. [8] propose the introduction of a category of "territories with a special functional character" to improve the accuracy of tax accounting and transparency of land use.

Bennett R., Unger E.-M., Lemmen Ch. et al. [9] analyze the relevance of cadastral data and propose a fit-for-purpose model for the sustainable functioning of systems. International experience shows that cadastral systems are developing towards digitalization, integration and openness of data. It is important for Kazakhstan to implement international standards and form a unified digital ecosystem of real estate accounting.

Materials and methods

The study used monographic, analytical and expert methods. The monographic method was applied to study the theoretical foundations of cadastral registration, to analyze scientific sources and practical approaches to its modernization, and to identify key areas of digital transformation. It also made it possible to generalize international experience and determine how foreign practices can be adapted to the national cadastral system.

The analytical method made it possible to reveal the main trends and problems in the functioning of the cadastral system, to establish the relationship between technological, organizational, economic and legal aspects of its improvement. Within the framework of this approach, indicators of the level of digitalization, data quality and interdepartmental interaction were analyzed. The use of a systematic approach ensured a comprehensive view of cadastral registration as part of the digital ecosystem of public administration, where geoinformation, registration and management processes are closely interconnected.

The expert method was used to conduct a SWOT analysis aimed at identifying the strengths and weaknesses of the national cadastral system, as well as assessing external opportunities and threats affecting its effectiveness. The results obtained through the integrated application of these methods ensured the scientific validity of the study, allowed to identify promising directions for improving cadastral accounting and to develop practical recommendations for increasing its efficiency in the context of digitalization.

Results

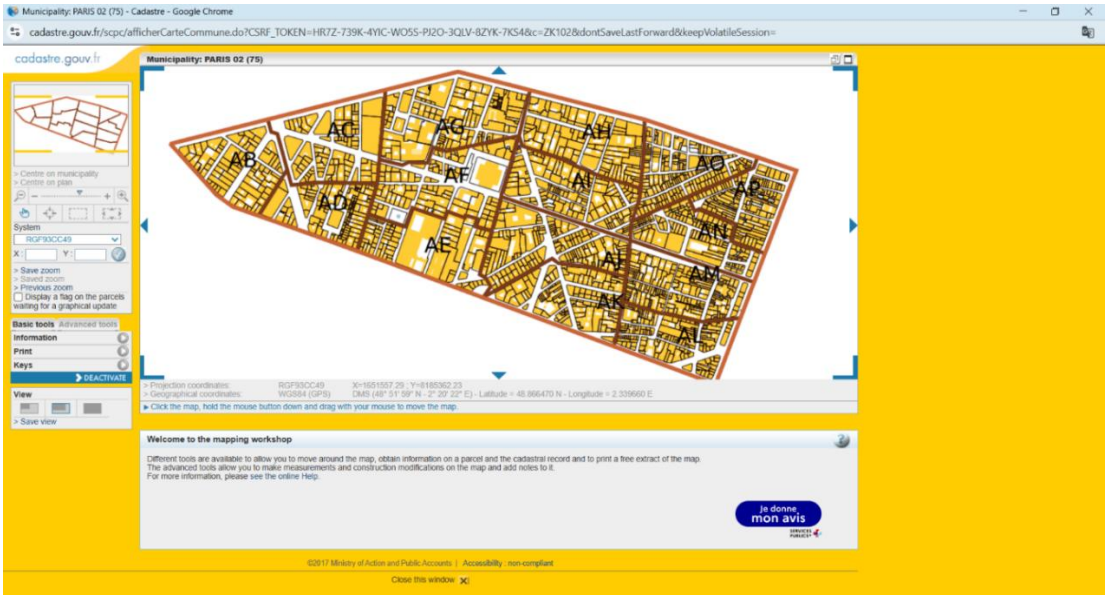
Cadastral registration in the Republic of Kazakhstan is a system that includes two interrelated areas: accounting carried out for the purpose of state registration of real estate rights, and qualitative and quantitative accounting of land. The joint operation of these areas ensures the completeness, reliability and spatial accuracy of the data that form the basis of the state land cadastre. Both of these areas are complementary elements of the unified state land cadastre system. The cadastral systems of foreign countries are characterized by considerable diversity, due to historical background, institutional conditions and legal traditions.

In France, where the origins of the modern cadastre date back to the Napoleonic period, its main purpose for a long time was to provide fiscal functions, while it is currently being transformed into an information and analytical system. In the countries of the Anglo-Saxon legal family, the registration approach prevails, focused on fixing and protecting property rights, which contributes to the stability of the real estate market and minimizes legal risks.

The German model, that is, the German one, demonstrates a high degree of integration of the cadastre and the land registry, ensuring the legal reliability of data on land plots and the accuracy of their spatial characteristics. In the Nordic countries, there is a tendency towards the formation of multifunctional cadastral systems that combine land registration and registration of rights in a single digital environment, which increases the level of transparency and accessibility of information for society and government authorities. Thus, the evolution of cadastral models in foreign countries reflects not only historical and legal features, but also modern socio-economic needs related to sustainable land management.

The cadastre in France has a deep history and one of the most advanced cadastral systems in the world. The French cadastre comes from the Napoleonic cadastre and applies to all lands, both urban and rural, regardless of whether the object is built on it or not. Textual information is closely related to geographical information. A plot is defined as a unit associated with the owner and with the tax division, in accordance with the Napoleonic concept. Basically, the cadastre performs a fiscal function, which evolves over time into an informational one and, additionally, has a certain evidentiary value. Cadastral documentation consists of a cadastral plan and a cadastral matrix of real estate. Anyone can request these documents (figure 1). The issuance of cadastral information may be paid, depending on the specific case (Portal of the Permanent Committee…) [10].

The cadastre in France is the closest analogue of the border plans (title plans). It is maintained by the French Public Land Registry Service (Service de Publicité Foncière) under the auspices of the tax authority, the General Directorate of Public Finance (Direction Générale des Finances Publiques, DGFiP). These plans are called plans cadastraux and represent a graphical representation of the boundaries of land plots in France. The plans show numbered plots, on the basis of which the ownership of the land is established. However, the plans themselves do not contain information about the owner of the property and do not necessarily show all land plots owned by one owner.

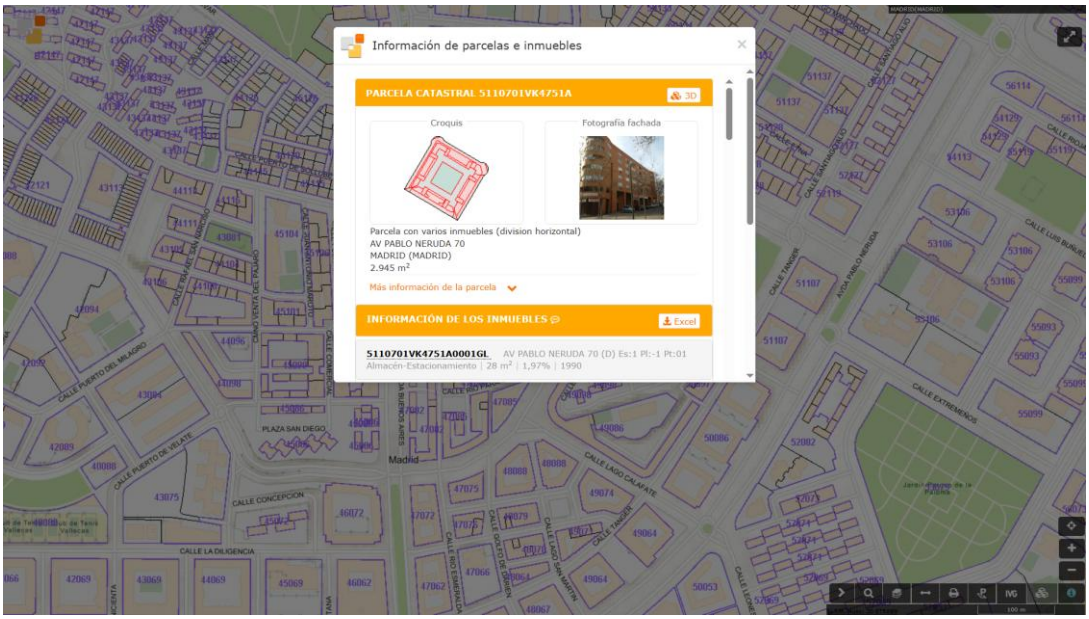


Note: the image was obtained from the official portal of the French cadaster (Official Portal of the French…) [11]

Figure 1 - Cadastral map of the II arrondissement of Paris.

Although they show the buildings, the size of the site and the local name (lieu-dit) of the object, the description of the boundaries in the cadastre is often vague or even absent altogether. This reflects the origin of cadastral plans that were created during the Napoleonic era for land tax purposes. As a result, in a formal sense, the cadastre is only an administrative document, which in itself does not generate rights and is not a title deed. Accordingly, although in most cases the cadastre performs the necessary functions, it cannot independently settle a dispute over borders. Cadastral plans may be challenged. If it becomes necessary to determine the boundaries of a site due to the ambiguity of the cadastre, the occurrence of a dispute or the division of the site between different owners, this process is called bornage (establishing boundaries). In this case, it is mandatory to involve the services of a land surveying engineer (géomètre), who will officially establish the boundaries and divide the land (The leading portal for property…) [12].

In Spain, cadastral activities are regulated and governed by the Ministry of Finance (Ministerio de Hacienda), and cadastral activities are regulated by the Consolidated Real Estate Cadastre Act, according to which this procedure is mandatory and free of charge (figure 2).



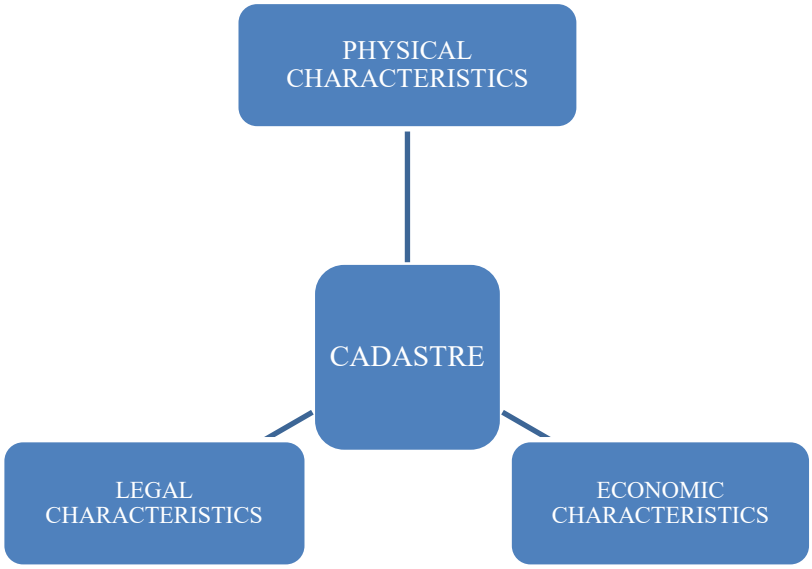
Note: the image was obtained from the official electronic portal of the Spanish Cadastre

Figure 2 – Cadastral map of a land plot with a description of an object in Madrid (Electronic Portal of the Spanish…) [13]

Figure 2 illustrates an example of a cadastral map in Spain created as part of the operation of the Catastro Inmobiliario system under the jurisdiction of the Ministry of Finance and Public Administration. The map shows the geometric boundaries of the site, its cadastral number, the contours of buildings and adjacent territories, as well as information about the area, address and functional purpose of the object.

A feature of the Spanish cadastral model is the complexity of the data presentation: each property is accompanied by a description of not only physical, but also economic characteristics, including cadastral value, form of ownership and information about the owner. This structure allows the cadastre to be used simultaneously as a tax, information-analytical and legal base (The website of the online …) [14].

Unlike in Kazakhstan, where cadastral maps in most cases serve as a spatial accounting tool, the Spanish system provides a close link between cadastral information and tax and property registers, which makes it multifunctional (figure 3). For Kazakhstan, such integration is a promising area for improving cadastral registration, which allows expanding the functionality of the Unified State Real Estate Cadastre and improving the quality of services for citizens and businesses.



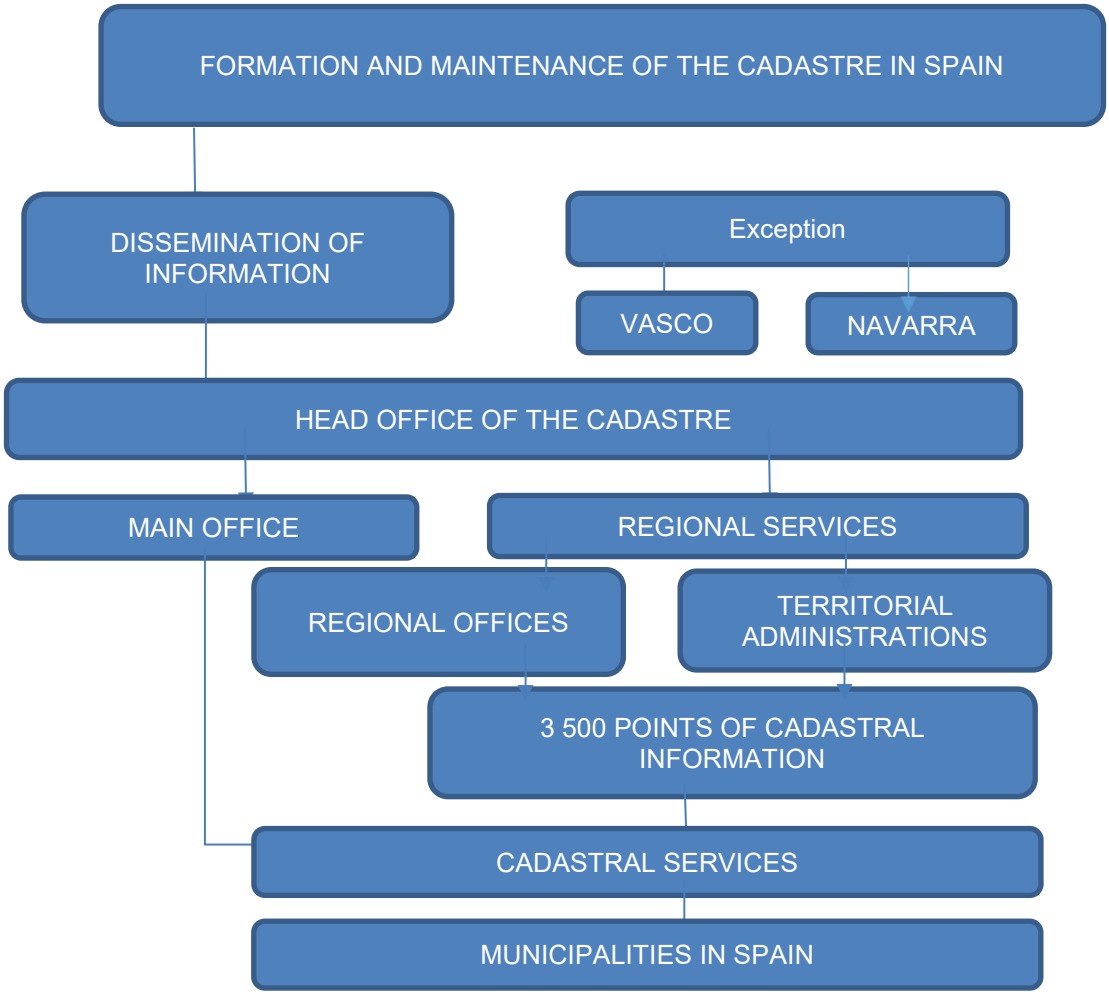
Note: compiled by the author

Figure 3 – Main characteristics of the Spanish cadaster

As shown in figure 3, the cadastral description of an object includes economic, legal, and physical characteristics.: the value of the property, information about the owner, location, area and boundaries of the plot. The cadastral system of Spain belongs to the Napoleonic type, where the main focus is on the fiscal function and taxation. Unlike the English- and German-speaking models, the Spanish system is not initially focused on information exchange, but close cooperation between government agencies and the General Directorate of the Cadastre ensures effective integration and exchange of data on land and real estate (figure 4).

Figure 4 describes the formation and maintenance of a real estate cadastre in Spain. From the table you can see that the exceptions are Basque Autonomous Community (Vasco) and Navarra autonomous communities within the Kingdom of Spain. The General Directorate of the Cadastre is responsible for the process of functioning of the cadastre in the kingdom. The Main Directorate performs its function through the head office and regional services, which have about 3 500 cadastral information points located in municipalities across the country, which provide a wide range of cadastral services.

In Western Europe, cadastral systems are created primarily for tax purposes. A distinctive feature of the cadastre in these countries is that they have been formed over the centuries and have more detailed legal documentation and a more advanced tax and registration system. The above advantages are a prerequisite for the economic and social development of the state. One of the key European information services is the European Land Information Service (EULIS) project.



Note: compiled by the author

Figure 4 – The structure of the cadastral system in Spain

The European Land Information Service provides access to land and property information across Europe to meet the needs of professional users — lenders, real estate agents and other professional groups. EULIS is the first source of information about European lands and real estate in a growing number of cross—border transactions, allowing you to instantly receive information online in English and Therefore, it is much faster and better to provide consultations to the applicant. The technical infrastructure of EULIS contributes to the goal of providing users with unhindered access to information about the land registry abroad, provided they have an appropriate agreement with the local land registry for online access (Official Website of the European…) [15].

Another information system is Infrastructure for Spatial Information in Europe (INSPIE). The INSPIE Directive aims to create a European Union Spatial Data Infrastructure (SDI) for the purposes of EU environmental policy and policies or activities that may have an impact on the environment. This European spatial data infrastructure will enable the exchange of environmental spatial information between public sector organizations, facilitate public access to spatial information across Europe, and assist in policy development across borders.

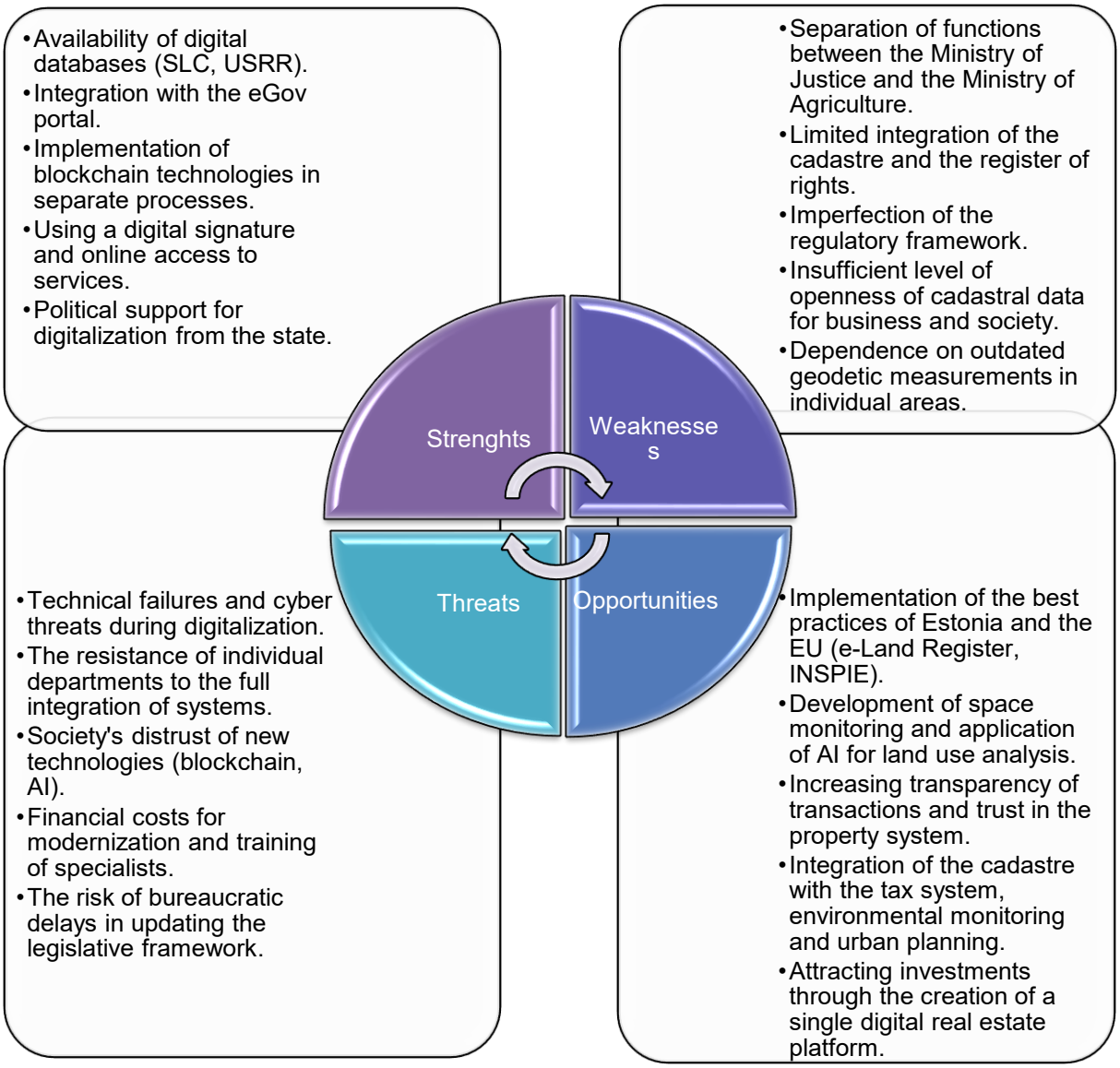
INSPIE is based on spatial information infrastructures created and operated by the member States of the European Union. The Directive addresses 34 spatial data topics required for environmental applications (Official Website of the European Union) [16].

The experience of Estonia, which is a pioneer in the field of digitalization of public services, including the real estate cadastre system, is interesting. As part of the e-Estonia initiative, various electronic solutions have been developed and implemented to improve the efficiency and transparency of land management. In 2022, the Estonian Land Department launched an electronic service that allows citizens to digitally indicate spatial data related to land use rights. The new mechanism replaced

paper diagrams, simplifying the process and increasing the accuracy of information (The website of the Public…) [17].

Estonia has implemented the e-Land Register system, which provides a full cycle of registration of real estate rights online. Integration with state registers allows for automatic data exchange, reducing administrative costs and speeding up registration procedures. The geoportal of the Land Department provides access to spatial data and thematic maps, which increases the transparency and accessibility of real estate information. The comprehensive digitalization of the cadastral system has allowed Estonia to significantly improve the efficiency of land management, minimize corruption risks and create favorable conditions for investment.

The experience of foreign countries shows that each cadastral accounting model has its advantages and limitations, and their implementation requires a systematic and adapted approach. The development of the national system in Kazakhstan is conditioned by the need to overcome the consequences of its historical stagnation and take into account the administrative, geographical and demographic characteristics of the state. The creation of the Unified State Real Estate Cadastre has become an important step towards integrating legal and land accounting, increasing transparency and reducing bureaucratic procedures. Currently, the Unified State Register of Legal Entities is at the stage of formation and requires further improvement to ensure the full digitalization of cadastral processes (figure 5).



Note: compiled by the author

Figure 5 - SWOT analysis of the cadastral system of Kazakhstan

Agricultural lands occupy a large part of the territory of the Republic of Kazakhstan and are a key element of the country's land fund. Their rational use and effective management require the improvement of cadastral registration as an instrument of state land policy and sustainable rural development.

Cadastral registration of farmland covers not only the registration of rights and boundaries of plots, but also the collection of data on their agroecological characteristics - soil condition, level of degradation, salinity and productivity. Such information provides the basis for land quality assessment, monitoring and planning of agricultural policy.

Currently, farmland is recorded as part of the land registry, which uses geoinformation technologies. The use of remote sensing of the Earth and satellite monitoring makes it possible to quickly identify unused or degraded lands, which increases the effectiveness of state control. The improvement of cadastral registration of agricultural lands will contribute to rational land use and increase the accuracy of spatial data that meets modern international standards.

As practice shows, the cadastral system of the Republic of Kazakhstan in a short period of time was able to transform the system according to a new model, which has a number of advantages, but also has a number of disadvantages, which are shown in figure 5 - SWOT analysis of the cadastral system of Kazakhstan. The strengths include the availability of digital databases that allow you to accumulate, process and store data. Integration with the e-government portal, which can facilitate and reduce document management time.

It is worth noting that recently blockchain technology has been used in certain processes, namely with smart contract transactions with real estate, which ensures the reliability of this procedure. Significant government support for digitalization in the country contributes to the integration of advanced technologies into electronic document management (table). The weaknesses include the fragmentation of the cadastral system itself and the frequent transfer of functions to different interdepartmental bodies, the imperfection of the regulatory framework and the limited integration processes in the cadastral system itself.

Table – Comparison of cadastral registration characteristics of foreign countries and Kazakhstan

Country	Cadastre (main features)	Registration of rights (real estate registry)	Characteristics of the accounting system
France	It is based on the Napoleonic cadastre (since the 19th century); the purpose is the tax accounting of all lands and buildings; cadastre = maps + descriptions.	Previously - Conservation des Hypothèques, since 2013. – Service de publicité foncière.	There are two systems in operation: the cadastre (tax) and the registry (legal), with full integration.
Spain	Catastro Inmobiliario is a geometric cadastre that is mandatory for taxation; it covers all lands and buildings.	Registro de la Propiedad – legal registration of property rights and encumbrances.	Dual system:the cadastre (tax) and registry (legal) are parallel and actively integrated.
Germany	Liegenschaftskataster is an accurate geodetic cadastre (maps, borders, areas).	Grundbuch is a land registry maintained by the courts.	Dual system: cadastre (technical) + Grundbuch (legal). Very high accuracy.
Kazakhstan	State land cadastre + real estate cadastre (digital database, coordinates, boundaries, assessment).	Unified State Register of Rights (USRR), maintained by the Ministry of Justice, integrated with eGov.	Integrated system: cadastre and registration of rights work through unified services.
Note: compiled by the author			

Table presents a comparative analysis of the cadastral systems of France, Spain, Germany, and Kazakhstan, reflecting differences in the level of digitalization and integration with registration structures. In France, the cadastre performs mainly tax functions, in Spain it combines geometric accuracy with legal registration, and in Germany the technical cadastre is fully linked to the land registry. The Kazakh system based on the Unified State Real Estate Cadastre and the Unified State Register of Rights is developing towards combining the cadastre and registration into a single digital platform, which corresponds to international trends in the formation of a "smart cadastre".

Discussion

The current state of cadastral registration in the Republic of Kazakhstan is marked by an

active process of digital transformation. Significant steps have been taken to modernize cadastral services, introduce electronic records, and develop digital platforms for land management. However, challenges remain, including data incompatibility, duplication of functions, and insufficient automation. These issues continue to affect the efficiency, reliability, and overall transparency of the system.

The effectiveness of the cadastral system depends on integrating accounting with registration, tax, and geographic information systems. Such integration would create a unified digital platform, improving data coordination, reducing redundancies, and enhancing accuracy. It would also support better decision-making for authorities, property owners, and businesses, while enabling more efficient management of land resources.

Global experience shows that digitalization and standardization increase transparency, shorten processing times, and improve spatial data accuracy. Online rights registration services and geoportals demonstrate potential for adaptation in Kazakhstan, enhancing service delivery and government-public interaction.

Blockchain technologies and smart contracts offer opportunities to increase trust in cadastral data while reducing administrative barriers. The use of three-dimensional models and geoinformation systems improves land accounting accuracy and supports urban planning and sustainable land use management.

Further development should follow international standards such as ISO 19152 (LADM). These standards ensure data unification, compatibility with foreign systems, and enable international cooperation. Implementation of these approaches will create a modern, stable cadastral system capable of effectively managing land resources and property relations in Kazakhstan.

Conclusion

1. The study showed that cadastral registration in Kazakhstan is undergoing a stage of digital transformation aimed at improving the quality and efficiency of spatial data. Despite the progress made, the system needs to be upgraded and integrated with modern digital platforms.

2. The main problems are the fragmentation of information resources, low automation and poor compatibility of departmental systems. The solution is possible through the introduction of GIS technologies, blockchain platforms and smart contracts for transparency and automation of processes.

3. An important area is the integration of cadastral and construction data within Geo BIM, combining the technical and legal aspects of real estate. The application of the ISO 19152 (LADM) standard will ensure the unification and comparability of data with foreign systems.

4. Kazakhstan is moving towards the creation of a "smart cadastre", a digital platform for accounting, analysis and management of land resources. This requires updating the regulatory framework, staff development, and the gradual introduction of digital solutions into public administration.

5. Thus, the improvement of the cadastral registration system is a strategic direction for the modernization of land relations, ensuring their transparency, efficiency and sustainable development of the territories of the Republic of Kazakhstan. The implementation of the proposed measures will make it possible to form a modern, integrated and technologically advanced cadastral accounting system that meets international standards and national priorities.

Conflict of interests: the author declare no conflict of interest.

References

[1] Послание Главы государства К.-Ж.Токаева народу Казахстана «Казахстан в эпоху искусственного интеллекта: актуальные задачи и их решения через цифровую трансформацию» [Электронный ре-сурс]. – 2025. – URL: https://www.akorda.kz/ru/ poslanie-glavy-gosudarstva--kasym--zhomarta-to--kaeva-narodu-kazahstana--kazahstan--v--epohu-iskusstvennogo-intellekta-aktualnye--zadachi-i-ih-resheniya-cherez-cifrovuyu-transformaciyu-885 145 (дата обращения: 22.09.2025).

[2] Noardo, F. Opportunities and challenges for GeoBIM in Europe: developing a building permits use-case to raise awareness and examine technical interoperability challenges / F. Noardo, C. Ellul, L. Harrie, I. Overland, M. Shariat, K. Arroyo Ohori, J. Stoter // Journal of Spatial Science. -2020. -Vol.65. –P. 209 - 233. https://doi.org/10.1080/14498596.2019.1627253.

[3] Sladic, G. A Blockchain Solution for Securing Real Property Transactions: A Case Study for Serbia / G. Sladic, B. Milosavljevic, S. Nikolic, D. Sladic, A.Radulovic//ISPRS International Journal of Geo-Information.-2021. -Vol.10.- Issue 1. -Article 35. https://doi.org/10.3390/ijgi10010035.

[4] Thebault, M. Multicriteria roof sorting for the integration of photovoltaic systems in urban environments / M. Thebault, V. Clivillé, L. Berrah, G. Desthieux // Sustainable Cities and Society. -2020. -Vol.60. – Article 102259. https://doi.org/10.1016/j.scs.2020.102259.

[5] Bennett, R. Hybrid Approaches for Smart Contracts in Land Administration: Lessons from Three Blockchain Proofs-of-Concept / R. Bennett, T. Miller, M. Pickering, A. Kara// Land. - 2021. -Vol.10. – Issue 1. - Article 220. https://doi.org/10.3390/land10020220

[6] Oukes, P. Domain-Driven Design Applied to Land Administration System Development: Lessons from the Netherlands / P. Oukes, M. Andel, E. Folmer, R. Bennett, C.Lemmen// Land Use Policy. -2021. -Vol.104. - Article 105379. https://doi.org/10.1016/j.landusepol.2021.105379

[7] Lemmen, C. The Land Administration Domain Model / C. Lemmen, P. Oosterom. R. Bennett// Land Use Policy. -2015.- Vol. 49. – P. 535 - 545. https://doi.org/ 10.1016/j.landusepol.2015. 01.014

[8] Matuk, O. Consolidating the Polish Land Use Cadastral Register with the Austrian and German Systems: An Extension of the Polish Cadastre Model Towards Sustainable Land Management / O. Matuk, B. Całka// Sustainability. - 2025. -Vol.17. - Article 5783. https://doi.org/ 10.3390/su17135783

[9] Bennett, R. Land Administration Maintenance: A Review of the Persistent Problem and Emerging Fit-for-Purpose Solutions / R. Bennett, E.M. Unger, C. Lemmen, P. Dijkstra// Land. - 2021. -Vol. 10. - Article 509. https://doi.org/ 10.3390/land10050509

[10] Portal of the Permanent Committee on Cadastre in the European Union [Electronic resource].–2025.Available at: https://www.eurocadastre.org/pdf/documents/gil.pdf (date of access: 15.09.2025).

[11] Official Portal of the French Cadastre [Electronic resource].– 2025. Available at: https:// www.cadastre.gouv.fr/scpc/accueil.do (date of access: 15.09.2025).

[12] The leading portal for property in France [Electronic resource]. – 2025. Available at: https://www.french-property.com/guides/france/ property-rights/registration (date of access: 15.09.2025).

[13] Electronic Portal of the Spanish Cadastre [Electronic resource]. – 2025. Available at: https:// www1.sedecatastro.gob.es/Cartografia/ mapa.aspx?pest = rc&from = OVCBusqueda&final=&ZV=NO&ZR=NO&anyoZV=&tematicos=&anyotem= (date of access: 17.09.2025).

[14] The website of the online portal of mobility in Spain [Electronic resource]. – 2025. Available at: https://www.idealista.com/en/news/property-for-sale-in-spain/2023/02/16/108100-how-to-find-a-propertys-cadastral-reference-in-spain (date of access: 17.09.2025).

[15] Official Website of the European Land Information Service [Electronic resource]. – 2025. Available at: https://www.interoperable-europe.ec.europa.eu/ collection/ egovernment/solution/ european-land-information-service-eulis (date of access: 17.09.2025).

[16] Official Website of the European Union [Electronic resource]. – 2025. Available at: https:// www.knowledge-base.inspire.ec.europa.eu/overview_en (date of access: 17.09.2025).

[17] The website of the Public Broadcasting Corporation of Estonia. [Electronic resource]. – 2025. Available at: https://www.rus.err.ee/1609251807/departament-zhiteli-jestonii-teper-mogut-ukazyvat-svoi-prava-na-zemelnyj-uchastok-v-internete (date of access: 17.09.2025).

References

[1] Poslanie Glavy gosudarstva K.-ZH. Tokaeva narodu Kazahstana «Kazahstan v jepohu iskusstvennogo intellekta: aktualnye zadachi i ih reshenija cherez cifrovuju transformaciju» [President K.-J. Tokayev State of the Nation Address to the People of Kazakhstan "Kazakhstan in the Era of Artificial Intelligence: Current Challenges and Solutions through Digital Transformation"] (2025). Available at: https://www.akorda.kz/ru/poslanie-glavy--gosudarstva--kasym--zhomarta--tokaeva-narodu-kazahstana-kazahstan-v-epohu-iskusstvennogo-intellekta-aktualnye-zadachi-i-ih-resheniya-cherez-cifrovuyu-transformaciyu-885145 (date of access: 22.09.2025) [in Russian].

[2] Noardo, F., Ellul, C., Harrie, L., Overland, I., Shariat, M., Arroyo Ohori, K., Stoter, J. (2020). Opportunities and challenges for GeoBIM in Europe: developing a building permits use-case to raise awareness and examine technical interoperability challenges. *Journal of Spatial Science*, 65(2), 209-233. https://doi.org/10.1080/14498596.2019.1627253 [in English].

[3] Sladic, G., Milosavljevic, B., Nikolic, S., Sladic, D., Radulovic, A. (2021). A Blockchain Solution for Securing Real Property Transactions: A Case Study for Serbia. *ISPRS International Journal of Geo-Information*, 10 (1), 35. https://doi.org/10.3390/ijgi10010035 [in English].

[4] Thebault, M., Clivillé, V., Berrah, L., Desthieux, G. (2020). Multicriteria roof sorting for the integration of photovoltaic systems in urban environments. *Sustainable Cities and Society*, 60, 102259. https://doi.org/10.1016/j.scs.2020.102259 [in English].

[5] Bennett, R., Miller, T., Pickering, M., Kara, A. (2021). Hybrid Approaches for Smart Contracts in Land Administration: Lessons from Three Blockchain Proofs-of-Concept. *Land*, 10(1), 220. https://doi.org/10.3390/land10020220 [in English].

[6] Oukes, P., Andel, M., Folmer, E., Bennett, R., Lemmen, C. (2021). Domain-Driven Design Applied to Land Administration System Development: Lessons from the Netherlands. *Land Use Policy*, 104, 105379. https://doi.org/10.1016/j.landusepol.2021.105379 [in English].

[7] Lemmen, C., Oosterom, P., Bennett, R. (2015). The Land Administration Domain Model. *Land Use Policy*, 49, 535-545. https://doi.org/10.1016/j.landusepol.2015.01.014 [in English].

[8] Matuk, O., Całka, B. (2025). Consolidating the Polish Land Use Cadastral Register with the Austrian and German Systems: An Extension of the Polish Cadastre Model Towards Sustainable Land Management. *Sustainability*, 17(13), 5783. https://doi.org/10.3390/su17135783 [in English].

[9] Bennett, R., Unger, E.M., Lemmen, C., Dijkstra, P. (2021). Land Administration Maintenance: A Review of the Persistent Problem and Emerging Fit-for-Purpose Solutions. *Land*, 10 (5), 509. https:// doi.org/ 10.3390/ land10050509 [in English].

[10] Portal of the Permanent Committee on Cadastre in the European Union (2025). Available at: https://www.eurocadastre.org/pdf/documents / gil.pdf (date of access: 15.09.2025) [in English].

[11] Official Portal of the French Cadastre (2025). Available at: https://www.cadastre. gouv. fr/scpc/accueil.do (date of access: 15.09.2025) [in English].

[12] The leading portal for property in France (2025). Available at: https://www.french-property.com/guides/france/property-rights/registration (date of access: 15.09.2025) [in English].

[13] Electronic Portal of the Spanish Cadastre (2025). Available at: https://www1.sedecatastro.gob.es/Cartografia/mapa.aspx?pest=rc&from=OVCBusqueda&final=&ZV=NO&ZR=NO&anyoZV=&tematicos=&anyotem= (date of access: 17.09.2025) [in English].

[14] The website of the online portal of mobility in Spain (2025). Available at: https:// www.idealista.com/en/news/property-for-sale-in-spain/ 2023/02/16/108100-how-to-find-a-propertys-cadastral-reference-in-spain (date of access: 17.09.2025) [in English].

[15] Official Website of the European Land Information Service (2025). Available at: https:// www.interoperable-europe.ec.europa.eu/collection/egovernment/solution/european-land-informa-tion-service-eulis (date of access: 17.09.2025) [in English].

[16] Official Website of the European Union (2025). Available at: https://www.knowledge-base.inspire.ec.europa.eu/overview_en (date of access: 17.09.2025) [in English].

[17] The website of the Public Broadcasting Corporation of Estonia (2025). Available at: https://www.rus.err.ee/1609251807/departament-zhiteli-jestonii-teper-mogut-ukazyvat-svoi-prava-na-zemelnyj-uchastok-v-internete (date of access: 17.09.2025) [in Russian].

Information about the author:

Zhekebayev Altynbek - **The main author**; Ph.D student of the Department of Cadastre; S.Seifullin Kazakh Agro Technical Research University; 010011 Ave. Zhenis, 62, Astana, Kazakhstan; e-mail: altynbek.alem@inbox.ru; https://orcid.org/0009-0008-5059-1570

Автор туралы ақпарат:

Жекебаев Алтынбек - **негізгі автор**; «Кадастр» кафедрасының Ph.D докторанты; С.Сейфуллин атындағы Қазақ агротехникалық зерттеу университеті; 010011 Жеңіс даңғ., 62, Астана қ., Қазақстан; e-mail: altynbek.alem@inbox.ru; https://orcid.org/0009-0008-5059-1570

Информация об авторе:

Жекебаев Алтынбек – **основной автор**; докторант Ph.D кафедры «Кадастр»; Казахский агротехнический исследовательский университет им. С.Сейфуллина; 010011 пр. Женис, 62, г.Астана, Казахстан; e-mail: altynbek.alem@inbox.ru; https://orcid.org/0009-0008-5059-1570