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IMPROVEMENT OF ECONOMIC EVALUATION OF AGRICULTURAL LAND IN THE LAND CADASTER WORKS

Mejora de la valoración económica de los terrenos agrícolas en las obras de catastro de tierras

Melhoria da valoração econômica dos terrenos agrícolas nas obras de catastro de terras

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ABSTRACT
The research addresses the main methods of improvement and optimization of agricultural land assessment in the land cadaster works. The research aims to develop the main ways to improve both theoretical and practical aspects of the economic evaluation of agricultural lands in land-cadastral works. During the research the recent land reforms and trends in the land market of the Republic of Kazakhstan were analyzed; in particular, the recent changes in the Land Code of the Republic of Kazakhstan and other normative legal acts were identified, the main rules of maintaining the state land cadaster were characterized, and the main ways of improving the quality of agricultural land assessment in land and cadaster works were proposed. It has been established that the existing methodology of evaluation has certain contradictions and drawbacks in the developed methodological approaches and working programs, therefore it should be corrected and adapted to modern social and economic conditions and market tendencies. Based on the obtained results of the research, theoretical generalizations, and substantiations new methodological approaches can be developed, as well as recommendations and proposals for the proper organization of economic evaluation of agricultural lands in the land cadaster works.

KEYWORDS
Land management, land resource management, market conditions, agrarian sector, efficiency.

RESUMEN
Abordamos los principales métodos de mejora y optimización de la evaluación de las tierras agrícolas en las obras catastrales. La investigación tiene como objetivo desarrollar las principales vías para mejorar los aspectos teóricos y prácticos de la evaluación económica de las tierras agrícolas en las obras del catastro de tierras. Durante la investigación, analizamos las recientes reformas agrarias y las tendencias en el mercado de tierras de la República de Kazajstán; en particular, se identificaron los cambios recientes en el Código de Tierras de la República de Kazajstán y otros actos jurídicos normativos, se caracterizaron las principales normas de mantenimiento del catastro estatal de tierras y se propusieron las principales formas de mejorar la calidad de la evaluación de las tierras agrícolas en los trabajos de catastro de tierras. Se ha establecido que la metodología existente de evaluación tiene ciertas contradicciones e inconvenientes en los enfoques metodológicos y programas de trabajo desarrollados, por lo que debe ser corregida y adaptada a las condiciones sociales y económicas modernas y a las tendencias del mercado. Sobre la base de los resultados obtenidos de la investigación, las generalizaciones teóricas y los fundamentos pueden desarrollar nuevos enfoques metodológicos, así como recomendaciones y propuestas para la correcta organización de la evaluación económica de las tierras agrícolas en las obras del catastro.

PALABRAS CLAVE
Manejo del territorio, gestión del recurso suelo, condiciones de mercado, sector agrario, eficiencia.

RESUMO
Abordamos os principais métodos de melhoria e otimização da avaliação de terrenos agrícolas em trabalhos cadastrais. A pesquisa visa desenvolver as principais formas de melhorar os aspectos teóricos e práticos da avaliação econômica de terras agrícolas em trabalhos de cadastro fundiário. Durante a pesquisa, analisamos reformas agrárias recentes e tendências no mercado fundiário da República do Cazaquistão; em particular, foram identificadas alterações recentes no Código de Terras da República do Cazaquistão e outros atos jurídicos normativos, foram caracterizadas as principais regras de manutenção do cadastro de terras do estado e foram propostas as principais formas de melhorar a qualidade da avaliação das terras agrícolas no trabalho de cadastro de terras. Foi estabelecido que a metodologia de avaliação existente apresenta certas contradições e inconvenientes nas abordagens metodológicas e nos programas de trabalho desenvolvidos, razão pela qual deve ser corrigida e adaptada às condições sociais e econômicas modernas e às tendências do mercado. Com base nos resultados obtidos na investigação, generalizações e fundamentos teóricos podem desenvolver novas abordagens metodológicas, bem como recomendações e propostas para a correta organização da avaliação econômica das terras agrícolas em trabalhos cadastrais.

PALAVRAS-CHAVE
Gerenciamento territorial, gestão dos recursos fundiários, condições de mercado, setor agrícola, eficiência.

Introduction

The economy of Kazakhstan is heavily dependent on agriculture, with the government prioritising the growth and advancement of the agro-industrial sector. This include enhancements in technological, economic, environmental, and legal aspects, as well as the promotion of agricultural sales. Agricultural land is essential, primarily for the production of items that make a major contribution to the state budget. Crop yields are influenced by land features such as soil fertility, terrain, and climate. Therefore, the assessment of agricultural land holds great importance for the nation's economic and strategic advancement. Building on the research of Hartvigsen and Gorgan (2020) and Zhanbusinova (2021), recent years have witnessed substantial changes in all sectors of activity within the Republic of Kazakhstan. Consequently, agricultural land is now classified as real estate, necessitating the implementation of a fee-based land use policy. To effectively institute and enhance such a policy, it is imperative for the government to establish and refine the current economic evaluation of agricultural land within the land cadaster works (Kondratenko et al., 2020).

Each parcel of agricultural land, whether owned or used, should be registered and assigned a market value. Comprehensive methods for improving the economic evaluation of agricultural land (land parcels) during land cadaster works are indispensable. These methods serve multiple purposes, including facilitating governmental management, enabling land users to efficiently manage available land resources, and systematizing a vast array of diverse information pertaining to the status of land resources and their potential for profitable utilization while minimizing costs. The central issue underpinning this research lies in the absence of a unified consensus within the Republic of Kazakhstan regarding the processes aimed at enhancing or optimizing the cadastral valuation of agricultural land. Moreover, many experts in this field contend that the existing methodology for economically evaluating the value of agricultural land during land cadaster works is imperfect and requires improvement. Consequently, there is a need to develop evaluation methods specifically tailored to the land market of the Republic of Kazakhstan.

For instance, Zhanbusinova (2021) analyzed the current practices of cadastral and market land evaluation in the Republic of Kazakhstan, elucidating the primary distinctions between the processes of their formation and application. Sarsembayev (2020), in his research, delved into the challenges associated with the economic evaluation of agricultural lands within the Akmola oblast and concluded that the foundation for the economic evaluation of land lies in soil appraisal. He also highlighted that the recent reorganization of many agricultural enterprises in recent years lacked adequate economic and land management support, resulting in an imbalance in the essential means of production. Collectively, these findings underscore the imperative to modernize land relations in the Republic of Kazakhstan, with particular emphasis on updating their legal regulations and enhancing the existing methodology for economically evaluating agricultural land during land cadaster works.

The research fills the gap in the existing methodology for assessing the economic value of agricultural lands during land cadaster works, particularly in light of recent changes classifying them as real estate and the need for a fee-based land use policy. By doing so, this research seeks to rectify identified issues, such as inconsistencies and imperfections in existing methodologies, and provide tailored solutions to modernize land relations, update legal regulations, and enhance the overall assessment of agricultural land value. The aim of this

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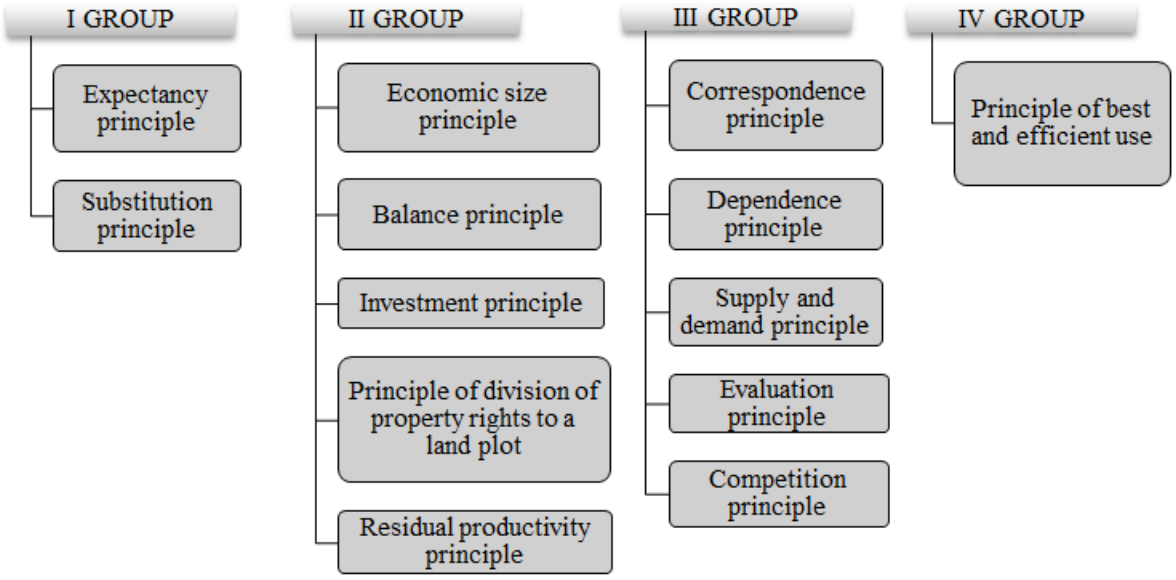
research is to devise key strategies for improving both the theoretical and practical aspects of the economic evaluation of agricultural lands within land cadaster works.

Materials and methods

During the scientific research the process of economic evaluation of agricultural lands, as the main component of the national wealth of the country, was addressed as it requires the implementation, first of all, of a comparative quantitative and economic evaluation of their useful properties, as well as environmental, technical, and economic effects of use. For a more thorough study of the problems of this research, the basic legal acts (the Land Code of the Republic of Kazakhstan (Republic of Kazakhstan, 2003a) regulating land relations, the maintenance of the land cadaster, as well as other important bylaws that define the norms of agricultural land turnover and the rate of the normative value of such land under private ownership, were used. In determining the economic valuation of agricultural land in the land cadaster works the basic principles and methods of land valuation were used. Thus, the basis of the principles determining the value of agricultural land is the rules and models of economic behavior that are used in the formation of the value of goods in the free market. Considering this, the researchers used four groups of principles shown in Figure 1.

Figure 1. Principles of economic evaluation of agricultural land in the land cadaster works
Figura 1. Principios de evaluación económica de terrenos agrícolas en las obras de catastro de tierras



Source: own elaboration. Fuente: elaboración propia.

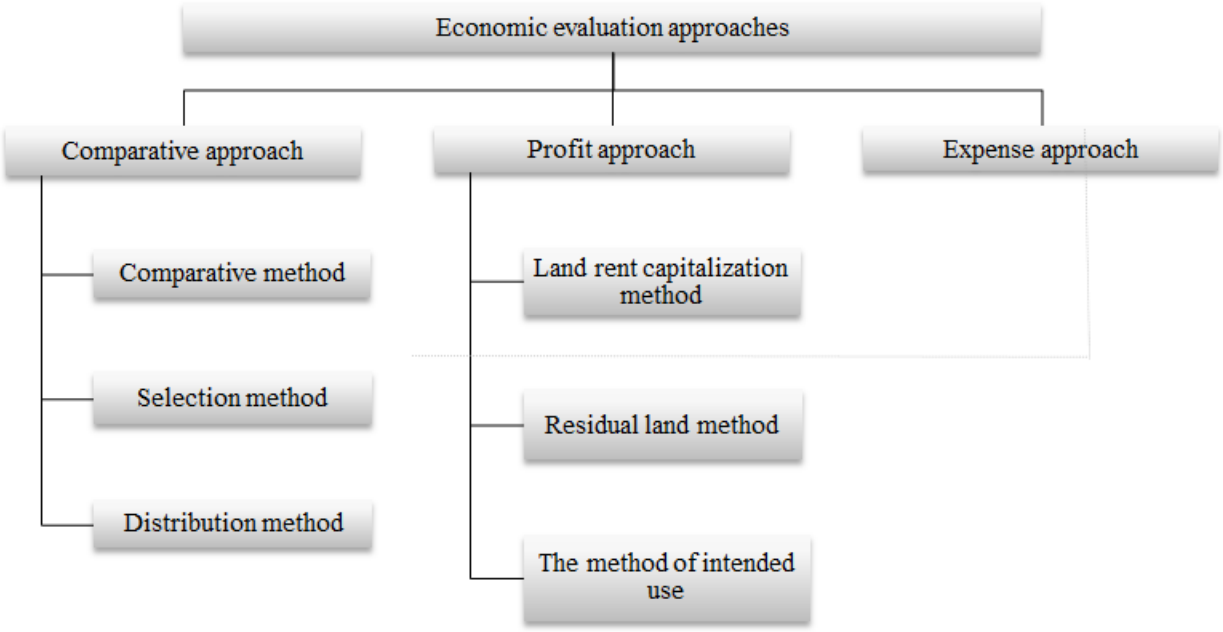
An examination of Figure 1 illustrates, the first group includes principles based on user beliefs. The second group covers the principles related to the object of ownership. The third group includes principles related to the market environment, and the fourth group is represented by the principle of best and efficient use. When analyzing the materials and methods of economic evaluation of agricultural land the following were also considered: the intended purpose and regulation of land use, methods of land use, as well as market conditions and expected changes in the land market in the Republic of Kazakhstan. Moreover, for pro-

per implementation of economic evaluation and determination of the market value of agricultural land plots in the research, three generally accepted approaches were considered, among them: comparative (market), profitable, and cost-based (Figure 2). The approaches may be used both separately and in the complex.

As such, the basis of the comparative approach is the principle of substitution. It assumes the process of land valuation as a commodity and considers all the pricing factors of a particular market in a certain period. This approach is usable after collecting and analyzing information on the sale of similar agricultural land plots to determine the scale of adjustment of values influencing the appraised value. The income approach implies the consideration of a land plot as the main factor of production that creates income. It can be used to determine the position of the prospective buyer and the intended use of the land plot. The expense approach evaluates land in the context of human labor and reflects its value in terms of the costs incurred to improve its condition. A comparative element was employed by analyzing land valuation practices in other countries to supplement the Republic of Kazakhstan data.

The next stage of the research included the determination of the algorithm of cadastral (appraised) value of agricultural land, which is carried out in four stages: stage I – land grouping; stage II – conducting intra-oblast land-valuation zoning; stage III – a compilation of appraisal scales and determination of the prime rate (standard), i.e. the average cost of 1 hectare of land by groups of soils within the land-appraisal districts; stage IV – establishment of the appraised value of the land plot and application of correction coefficients (integral indicators) to it.

Figure 2. Methods and approaches of economic evaluation of agricultural land in the land cadaster works
Figura 2. Métodos y enfoques de evaluación económica de terrenos agrícolas en los trabajos de catastro territorial



Source: own elaboration. Fuente: elaboración propia.

The methodological basis of the economic evaluation of land is the economic doctrine of soil fertility and differential rent, which has two categories: land rent I – the amount of addi-

tional net income received on lands of better natural fertility and location; land rent II – the amount of additional net income obtained by more intensive agricultural production in specific natural and economic conditions.

To improve the economic evaluation of agricultural land, it was also important to carry out the calculation of important economic indicators, among which:

1. The cost of gross output, the formula for calculating:

$$K_{ts} = S_p + P_p, \qquad (1)$$

Where: S_p is the production cost of a particular type of product, sum/t, P_p is the amount of surplus product, sum/t.

2. Payback costs, the calculation formula:

$$O_z = \frac{\mathrm{Pv}}{\mathrm{Zm}}, \qquad (2)$$

Where: Pv is the cost of gross output at cadastral prices, sum/t; Zm is material expenses per 1 hectare of land, sum.

3. The amount of differential income, the calculation formula:

$$D_d = \frac{P_v \times (O_z - 1.4)}{O_z}, \qquad (3)$$

Where: 1.4 – coefficient of added product size.

4. The amount of differential rent, the calculation formula:

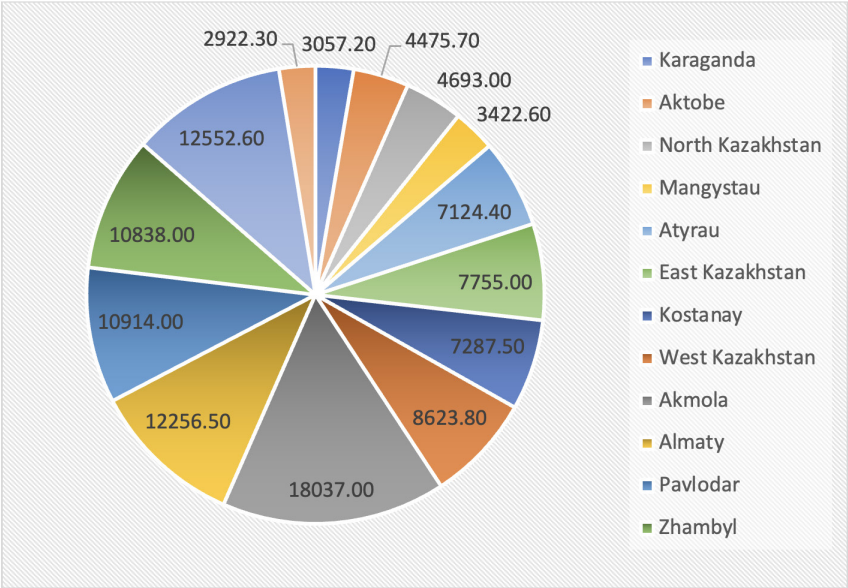
$$D_r = \frac{(Ts_v - Ts_i)}{U_n}, \qquad (4)$$

Where: Tsv – weighted average selling price of the main crop, soum/t, Tsi – individual production price, soum/t, Un – normal yield, t/ha.

Results

One of the most important economic tools for regulating fee-based land use is considered land valuation, which is an integral part of the state land cadaster created to provide an overall valuation of natural resources in the country's economic complex (Sannikov, 2017). Therefore, the economic evaluation of land is considered an effective mechanism contributing to the creation of a rational system of taxation and pricing. In addition, it acquires special importance in the purchase and sale of agricultural land, as well as in the conclusion of contracts for long-term or short-term leases. The uneven distribution of agricultural land and its heterogeneity (fertility, structure, groundwater table, slope angle) are key components in the economic evaluation of this category of land (Figure 3).

Figure 3. Diagram of the distribution of agricultural land by region of the Republic of Kazakhstan, 2021
Figura 3. Diagrama de distribución de tierras agrícolas por región de la República de Kazajstán, 2021



Source: own elaboration based on Republic of Kazakhstan (2021). Fuente: elaboración propia en base a Republic of Kazakhstan (2021).

Rational use of agricultural land and ensuring continuous improvement of its fertility requires the proper organization of comprehensive quantitative and qualitative land records based on a unified cadaster. Moreover, several state, sectoral, regional, and on-farm tasks can be accomplished by a comprehensive study of land quality indicators and the formation of a scale of their comparative evaluation. In this way, land relations will be better regulated and the land market will be actively developed (Okunola and Fakunle, 2021). Following the purpose and methods of land use, the agricultural land of the republic is divided into arable land (irrigated and rain-fed), perennial plantations, fallow land, pastures, and hayfields (improved and flood irrigation), which also affects the price of the land plot. This research examines the types of agricultural land in the largest areas of the country (Table 1).

Table 1. Agricultural land by type of land, 2021
Tabla 1. Tierras agrícolas por tipo de tierra, 2021

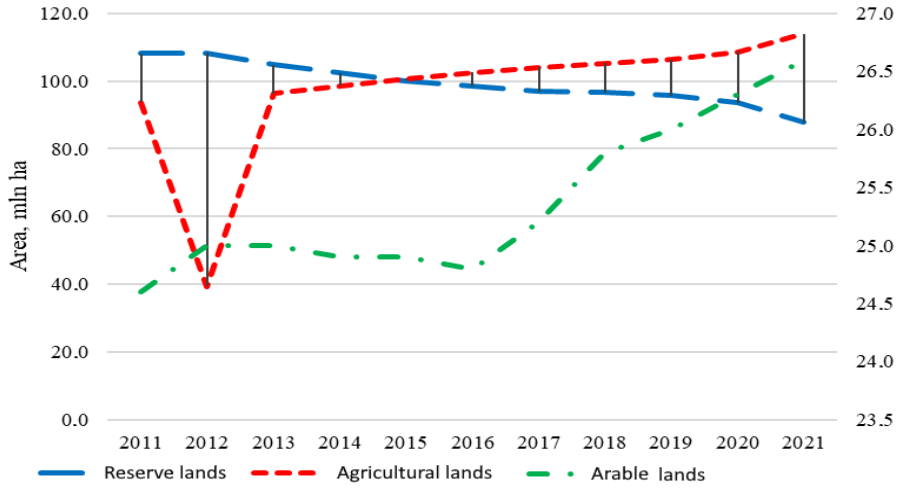
Region	Agricultural lands thousands of hectares	Arable lands thousands of hectares	Year-long crops thousands of hectares	Grasslands thousands of hectares	Hayland thousands of hectares	Pastures thousands of hectares
Karaganda	37395. 7	1370. 6	2. 3	382. 6	389. 5	35250. 7
Aktobe	26970. 2	708. 9	1. 6	501. 2	464. 6	25293. 9
East Kazakhstan	22629. 1	1502. 3	5. 8	230. 9	1057. 0	19833. 1
Akmola	13121. 5	6125. 4	6. 8	361. 3	243. 4	6384. 6
Kostanay	18013. 1	6293. 5	11. 2	223. 0	326. 8	11158. 6
Total	118129. 6	16000. 7	27. 7	1699. 0	2481. 3	97920. 9
Interrelation %	-	13. 55	0. 02	1. 44	2. 10	82. 89

Source: own elaboration based on Republic of Kazakhstan (2021). Fuente: elaboración propia en base a Republic of Kazakhstan (2021).

The table shows that the most valuable arable land in these areas is only 13.6%, with cheaper land, with pastures (82.9%) dominating. In recent years, the increase in agricultural land is caused by the development of reserve lands—not provided for ownership or land use, owned by district executive bodies (Figure 4). This land category was formed as a result of the land reform of 1991 during the reform of state agricultural enterprises. An increase in the area of arable land in the main grain-growing areas should also be noted. As such, following the Consolidated analytical report on the state and use of lands of the Republic of Kazakhstan (2021) arable land in the Pavlodar region was enlarged by 87.7 thousand hectares, Akmola – by 85 thousand hectares, Karaganda – by 69.3 thousand hectares, Kostanay region – 61 thousand hectares. hectares, Kostanai – 61.4 thousand hectares, North Kazakhstan – 21.1 thousand hectares, Turkestan – 10 thousand hectares, East Kazakhstan – 6.7 thousand hectares, Kyzylorda – 4.2 thousand hectares, Aktobe – 4.1 thousand hectares and Almaty – 0.6 thousand hectares of lands in reserve. Following the Consolidated analytical report on the state and use of lands of the Republic of Kazakhstan (2021), the area of land reserves in the Republic of Kazakhstan was 88 million hectares or more than a third of the land fund of the country. All regions of the country have such areas, but the leaders of land reserves are Karaganda (13.1 million ha or 14.9%), Aktobe (11.4 million ha or 12.9%), Mangistau (11.3 million ha or 12.9%), Kyzylorda (11.1 million ha or 12.6%), East Kazakhstan (8.5 million ha or 9.8%) regions. Agricultural lands are characterized by a special legal status, they are state-owned, under restrictions on the withdrawal from the land fund of Kazakhstan, and the legislation devotes special attention to the preservation and improvement of their fertility and antidegradation measures.

Figure 4. Dynamics of the areas of reserve land, agricultural land, and arable land in the Republic of Kazakhstan for 2011-2021

Figura 4. Dinámica de las superficies de tierras de reserva, tierras agrícolas y tierras cultivables en la República de Kazajistán para 2011-2021



Source: own elaboration based on Republic of Kazakhstan (2021). Fuente: elaboración propia en base a Republic of Kazakhstan (2021).

Analysis of the legal framework of the Republic of Kazakhstan has shown that the regulation of land relations in the country is provided by the Constitution of the Republic of Kazakhstan (Republic of Kazakhstan, 1995), Land Code of the Republic of Kazakhstan (Republic of Kazakhstan, 2003a) and other normative legal acts establishing basic social, economic, political and environmental aspects of modern land relations, as well as their state regulation and control. These regulatory and legal acts note that the land cadaster is presented in the form of a systematized report of data about the location, purpose, and legal status of land plots. Under the current land legislation of the Republic of Kazakhstan, the state acts as a subject of the creation of tools for the control and economic evaluation of land resources. Thus, it is established that in the current conditions in the Republic of Kazakhstan land is one of the most difficult objects of economic evaluation. First of all, this can be explained by the specificity of the object, the insufficiently formed and outdated legal and regulatory framework, and the underdevelopment of the country's land market. The practice of the previous decades shows that the absence of a market evaluation of land value leads to the appearance of inefficient land use in agriculture, which entails the emergence of many problems in the agricultural sector of the country's economy (Dolynska, 2023).

It is determined that in 2020 there were changes in the Land Code of the Republic of Kazakhstan (Republic of Kazakhstan, 2003a) concerning agricultural land. Thus, for small or medium-sized businesses when changing the designated purpose of land, it became possible to receive installments on payments of the cadastral (estimated) value of the land for up to 10 years. Also, the terms of certain procedures for consideration of documents for granting the right to a land plot were reduced. For example, the total time for considering an application for the right to a land plot was reduced from two months to fifteen working days. It should be noted that the development of the republic's land market is hindered by the Moratorium on the sale of agricultural land into private ownership, which has been extended until 2027, and stipulates that only the right to use these territories may be exercised (Republic of Kazakhastan, 2021). Also, some legal issues related to the assessment of the economic effect of the transfer of agricultural land into private ownership (by right of inheritance) are insufficiently developed. When conducting land cadaster works, information about the size of the country's land fund, landowners, land users, and land categories, as well as descriptions and assessments of their quality are considered. Currently, more than 1423 thousand ha or 1.2% of agricultural lands are privately owned by citizens and non-state legal entities (Table 2), temporary land use is provided to peasant farms and non-state land users in the amount of 110800 thousand ha, or 98.4%, and 882.6 thousand ha or 0.8% of agricultural lands are permanently owned by state legal entities.

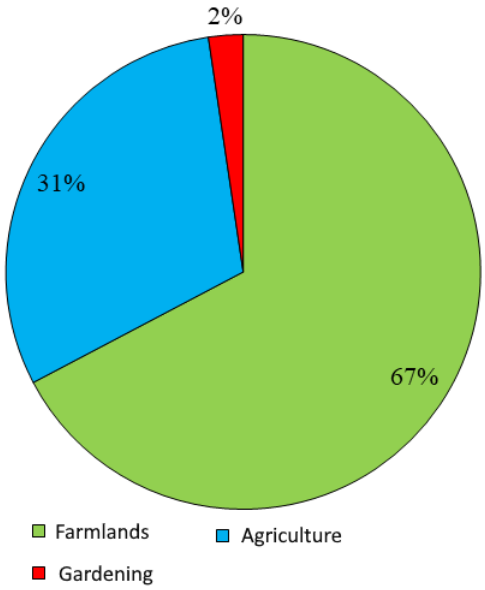
Table 2. Forms of ownership of certain categories of the land of the Republic of Kazakhstan, 2021
Tabla 2. Formas de propiedad de determinadas categorías de tierras de la República de Kazajistán, 2021

Land category	Overall area, thousands of hectares	Property type, thousands of hectares		Land use category, thousands of hectares	
		Private	State	Temporary	Permanent
Agricultural lands	113961. 4	1423. 2	112538. 2	110800	882. 6
Reserve lands	87989. 1	-	87989. 1	-	-

Source: own elaboration based on Republic of Kazakhstan (2021). Fuente: elaboración propia en base a Republic of Kazakhstan (2021).

Agricultural lands included in the private land fund have different purposes (Figure 5).

Figure 5. Distribution of agricultural land of the private land fund by the designated purpose of the Republic of Kazakhstan, 2021
Figura 5. Distribución de tierras agrícolas del fondo de tierras privadas según el propósito designado de la República de Kazajistán, 2021



Source: own elaboration based on Republic of Kazakhstan (2021). Fuente: elaboración propia en base a Republic of Kazakhstan (2021).

In the Republic of Kazakhstan, the land value is determined by two main types of evaluation: cadastral and market. Thus, the cadastral value of land is considered one of the key economic tools in the regulation of land relations, formed and regulated by the application of the normative indicator – the prime rate of payment for the unit of measurement of a land plot and appropriate adjustment coefficients (increasing or decreasing). It should be noted that the cadastral value also includes the characteristics of such factors as the quality and fertility of agricultural land, its geographical location, ameliorative condition, and others (Yesimov, 2022). This method of determining the economic valuation of the land is the basis for determining other forms of payments for land, such as land tax, collateral price, rent, and other payments. When forming the primary market for agricultural land, the prime rates are the basis for establishing the cadastral value of land plots provided by the state to citizens and economic entities for disposition, possession, or use (Table 3). Moreover, when cadastral taxation is applied, it is possible to calculate the expected profit and the part of it that results from the different quality of land and the geographical location of agricultural land. The market value of land is used in negotiating agreements for privately owned land. Thus, the land market is regulated based on supply and demand.

Table 3. Basic rates of pay for agricultural land in the main grain-producing regions of the Republic of Kazakhstan, considering soil types

Tabla3. Tasas salariales básicas para las tierras agrícolas en las principales regiones productoras de cereales de la República de Kazajistán, teniendo en cuenta los tipos de suelo

Region	Land type	Prime rate by type of soil, thousand tenge/ha					
		Leached and common chernozems	Southern chernozems	Dark brown	Brown	Light brown	
Akmola	Fallow land	49.4	34.4	24.4	18.1	11.9	27 6
	Arable land	71.9	63.1	53.1	46.9	43.1	55.6
	Hayland	14.4	13.1	10.6	10.6	6.9	11.1
	Pastures	9.2	8.1	6.9	5.6	4.4	6.8
Kostanay	Fallow land	51.9	35.6	26.9	19.4	11.9	29.1
	Arable land	73.1	63.1	51.9	46.9	43.1	55.6
	Hayland	14.4	13.4	11.6	10.6	5.6	11.1
	pastures	7.9	7.6	6.9	5.6	3.1	6.2
East Kazakhstan	Fallow land	55.6	38.1	29.4	-	-	41.0
	Arable land	71.9	63.1	54.9	-	-	63.3
	Hayland	15.6	14.4	11.9	-	-	14.0
	Pastures	12.8	10.6	8.1	-	-	10.5
Average		37.3	30.4	24.7	20.5	16.3	27.7

Source: own elaboration based on Republic of Kazakhstan (2003b). Fuente: elaboración propia en base a Republic of Kazakhstan (2003b).

As a rule, the cadastral value is more stable and constant for several years, while the market value is more flexible, as it is formed under the influence of supply and demand, land reforms, and other changes in the land market (Kerimkhulle et al., 2021). It is established that the value of land in the Republic of Kazakhstan is lower than in developed and leading countries. This is caused by the fact that there is no full-fledged land market in this country. Therefore, to carry out an effective economic evaluation of agricultural land in the land cadaster works, it is also necessary to consider the experience of developed countries, in which land evaluation systems are formed based on indicators of real market value and capitalization of income received during the active implementation of agricultural production.

In addition to the previous analysis, it has been determined that the economic evaluation of land is comprised of two primary types: a general economic evaluation of land, which assesses land plots as the principal means of production, and a private economic evaluation of land, which measures the effectiveness of cultivating individual crops. In general, the methodology of economic evaluation of agricultural land in the land cadaster works is based on the summarized data on the actual yield of crops, as well as all the material costs used for their cultivation, obtained over the past 3-5 years (Table 4).

Table 4. Calculation of the agricultural land assessment value in the Republic of Kazakhstan by average indicators using the example of wheat cultivation, 2019-2021
Tabla 4. Cálculo del valor de evaluación de las tierras agrícolas en la República de Kazajistán por indicadores promedio utilizando el ejemplo del cultivo de trigo, 2019-2021

Year	Gross harvest, mln tons	Production cost (Sp), thousand tenge/t	The cost of gross output (Kts), thousand tenge/t	Cost of gross output at cadaster prices (Pv), thousand tenge/t	Cost recovery (Oz), thousand tenge/ha	Differential income (Dd), thousand tenge/ha	Estimated price, thousand tenge/ha
2019	11.4	61.6	86.2	92.4	16	11.9	6030.4
2020	14.3	78.1	109.3	117.2	1.8	24.6	6864.9
2021	11.8	94.7	132.6	142.1	1.9	35.7	11251.4
Average	12.5	78.1	109.4	117.2	1.7	24.1	8048.9

Source: own elaboration based on formulas 1-4. Fuente: elaboración propia en base a fórmulas 1-4.

Utilizing space technologies like satellite imagery and geographic information systems (GIS) for land mapping is crucial for Kazakhstan, given its large, diverse landscapes and the need for efficient land resource management. These technologies provide accurate, up-to-date maps, essential for managing the complexity of Kazakhstan's terrain. They aid in precise land plot delineation, quality assessment, and usage identification, improving land management, reducing disputes, and enhancing transparency in land transactions. Developing a comprehensive land cadastre with these technologies streamlines land management, boosts efficiency, and combats corruption, fostering trust between citizens and stakeholders. The development of land maps and databases using space-based technologies represents a transformative approach to land regulation and management in Kazakhstan. These technologies enable accurate mapping, simplify land cadastre management, promote environmental conservation and enhance disaster management capabilities. As Kazakhstan continues to prioritise the growth of its agricultural sector and the strategic development of its economy, the integration of space technologies is becoming increasingly necessary. By harnessing the power of satellite imagery and GIS, Kazakhstan can modernise land management practices, reduce land disputes, increase transparency and ensure the sustainable use of its invaluable land resources. Ultimately, this integration will contribute to economic stability and the well-being of the country's citizens.

Thus, the calculations showed that the average estimated value of agricultural land, by the example of wheat cultivation, was 8048.9 thousand tenges per hectare. It is important to address the fact that during the cadastral valuation of agricultural land, given that it is practically not an object of purchase and sale, and there are no buildings and structures on it, there is practically no possibility to apply the comparative (market) and cost methods. Therefore, qualitative economic evaluation of this kind of land is possible only using land rent capitalization. It is rational to apply this method when evaluating agricultural land because it acts as an object on which enterprises annually grow crops and receive certain values of income and expenses when selling them on the market. Consequently, the value of a land plot is determined primarily by its ability to generate income in the future.

A well-functioning land market in Kazakhstan necessitates a harmonious interaction between financial, legal, and organizational institutions. To achieve this, it is imperative to improve the legal structure that governs land relations, implement a strategic approach to

spatial planning that takes into consideration landscapes and ecosystems, and ensure that there is effective coordination across different levels of government in land-use planning. It is imperative to construct infrastructure that can efficiently oversee the land market and provide a complete land database that is easily available to the public, utilizing GIS and space technologies. These steps will facilitate accurate assessment of agricultural land value, effective redistribution to productive agricultural producers, and the active operation of lending institutions.

Discussion

Concluding the research, it can be concluded that the process of improving the economic evaluation of agricultural land in the land cadaster works is a complex and multi-stage process. There is no single, universal approach yet because each country has its peculiarities in legislation, economy, science, etc. A study by Hungarian scientists M. Hartvigsen and M. Gorgan (2020) showed that in four Central Asian countries, including Kazakhstan, agricultural land markets are at the initial (2nd of 4 according to the classification presented in the paper) stage of development: agricultural land remains in state ownership, and land use rights still cannot be sold in the formal land market. One of the reasons for the underdeveloped agricultural land market in the country is also the specific conditions of farming: large areas and low population density, geographical remoteness from markets, and lack of access to maritime routes. For the effective use of agricultural land assessment tools in the land cadaster works it is necessary to consider the experience of other countries. Gorgan and Hartvigsen (2022) argue that the development of the agricultural land market is facilitated by the use of special tools, which include land consolidation, land bank, simplification of lease procedures, active management of state agricultural land, strengthening regulation of land use and land tenure.

Following Kovaleva et al. (2021) to determine the adequate price of land, to increase access to land for all agricultural producers, as well as to determine the feasibility of using land for different purposes, a modern normative monetary evaluation, fully considering all qualitative properties of land, in particular the fertility of its soil, the location of land relative to major cities, which are the centers of product sales, is necessary. Aside from determining an adequate valuation of land for its circulation, an important problem in the world is the preservation of soils from degradation to expand the provision of ecosystem services. When soils are used rationally, their fertility not only does not decrease, but may even increase, which can be interpreted as the provision of an ecosystem (ecological) service to society by the land user, and the service must be paid for. Consequently, to determine the amount of such payment for increasing fertility, compensation payments, which are a mechanism of soil management, should function.

Following Taipov (2010), the method of assessing the rent income from the sale of agricultural products and crop production is widely used in international practice. Following the example of European countries, the economic assessment of land plots in France is based on the calculation of rental income by thirteen classes of land. In each class, two typical agricultural enterprises are selected, with one enterprise located on the worst land and the other on the best land. Based on their financial statements, rent income per unit area is established. The average annual income is calculated for the last fifteen years, but the most and least favorable years are not taken into account. In England, economic evaluation is based

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on determining the value of standard net production for each class of land, of which there are only five. This economic indicator is calculated as the difference between the value of produced products and the costs obtained at the average level of agricultural technology. It was determined that in the Czech Republic, the economic valuation of the land is influenced by the index of capitalization of the gross rent effect, which is calculated per monetized soil ecological unit and considers all the structural, product, price characteristics, as well as a list of necessary costs (Pavlishchuk et al., 2022).

Other conditions are observed in Sweden. In this country, the current legislation regulates all conditions concerning land ownership and use, as well as ensuring and controlling the rational use of agricultural land and its preservation. The state does not interfere in the pricing process, the purchase and sale of land are free, and negotiated prices are established. In South Africa land is valued using three common approaches: comparative (market), profit, and cost approaches, and in the United States (Kutia et al., 2023) the income approach is used to value agricultural land, with the capitalization rate being a five year weighted rate. In Canada, the economic evaluation of agricultural land has a different methodology. The main crop yield of wheat is addressed, and other crops are reflected in conventional grain units (according to their yield level) in the form of stable coefficients.

Thus, it can be concluded that in countries with a market economy, the process of pricing agricultural land does not depend on establishing a baseline or normative price level (such a process is characteristic of many post-Soviet countries), but rather on the resulting forecast estimates that integrate key market factors. Following the Consolidated analytical report on the state and use of lands of the Republic of Kazakhstan (2021) Kazakhstan Land tax and payment for the use of land plots are regulated by the state based on tax legislation by establishing basic tax rates depending on the soil appraisal score for agricultural lands, other categories of land and as a percentage of the cadastral value for individuals. The infrastructure of the land market is represented by the state land cadaster; public service centers; establishment of rules for conducting tenders, competitions, auctions when providing land plots for lease, selling them or rights to lease, state registration of rights to real estate; implementation of state control over the use and protection of land (Kerimkhulle et al., 2022). However, the improvement of land relations requires certain organizational measures for legislative and legal support in the context of the introduction of private ownership of agricultural land.

Thus, based on the research, it was determined that large agricultural areas are difficult to monitor due to the lack of modern and accurate maps, as well as an outdated and undeveloped network of operational monitoring points and ground stations. It should be noted that due to various organizational-economic, climatic, and natural processes, there are constant changes in the boundaries of cultivated areas. The listed factors interfere with the reception of the objective information used for an estimation of the current situation on the agricultural lands, and the present conditions and the newest technologies provide possibilities for the decision of such problems. For example, it is possible to fix agricultural areas using satellite equipment, and the involvement of other space technologies in the process of economic evaluation of land will simplify monitoring, significantly reduce the time of land cadaster works and increase the reliability of data characterizing the level of land use (Chovnyuk et al., 2022). Besides, the analysis of agricultural lands based on GIS technologies will make it possible to rationally determine their economic purpose and determine the main ways of

increasing the efficiency of their attraction and turnover.

Conclusions

It is established that as of 2021 the agricultural lands of the Republic of Kazakhstan amounted to 114 million hectares or more than 41% of the total area. The largest areas of land in this category are located in Karaganda (15.8%), Aktobe (11%), East Kazakhstan (10.8%), Akmola (9.6%), and Kostanay (9.5%) regions. Agricultural lands of the republic are divided into ploughland, perennial plantations, fallow land, pastures, and hayfields according to their designated purpose, which determines the price of these lands. It has been established that the most valuable lands—arablee land in the studied oblasts did not exceed 13.6%, and cheaper lands—pastures amounted to 82.9%. It was discovered that the increase in the area of agricultural land in the republic was from the land reserve. Over the past 10 years, there has been an increase in the amount of arable land, especially in the grain-growing regions. Some changes in the normative-legal base of regulation of land relations aimed at the development of the land market in Kazakhstan were revealed. It was also determined that the Moratorium on the sale of agricultural land into private ownership, set until 2027, inhibits market relations.

In a comprehensive analysis of this study exploring the improvement of agricultural land valuation in Kazakhstan's cadaster works, salient conclusions can be drawn pertaining to the limitations within the extant frameworks, the imperative to align valuation processes with contemporary conditions, and the potential of incorporating international best practices. The core outcomes indicate that contraditions exist in the methodological approaches and norms applied for cadastral appraisals of farmlands in Kazakhstan. These need recalibration in consonance with prevailing socioeconomic ambits. Although agriculture's preeminent status is irrefutable, fully realizing market-centered mechanisms remains encumbered by enduring policy and legislative constraints. Integrating market dynamics can engender greater consistency in valuation. Additionally, embracing frameworks from progressive international contexts regarding aspects like rental income capitalization and the ecosystem services model can significantly enhance the methodologies. The implications point to updated legal structures and policy reform as indispensable catalysts that can enable legitimate land transactions, equitable access and sustainable utilization patterns, while stimulating efficiency gains, conservation and growth within Kazakhstan's agricultural sector. Mainstreaming ecological parameters rather than just profitability alone, deploying technologies to map land use nuances, and fostering flexibility to adapt to shifting geo-climatic and market forces carry profound influence in optimizing future valuation and its derived benefits.

Considering the results obtained, a conclusion is made that the mechanism to increase the efficiency of economic evaluation of agricultural and agro-industrial lands should be based on: well-functioning legal mechanisms for the regulation of land relations at all levels of government; state support in legal and financial matters; modern methods of obtaining information about the state and level of land resources and their potential. Systems of recording, assessment, and monitoring should be based on new technologies, such as space technology, which will help create the necessary land maps and databases, which will greatly simplify the system of regulation and streamlining of land relations and promote the active development of the land market in Kazakhstan, ensuring all the rights of landowners and land users.

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