https://doi.org/10.7494/geom.2025.19.1.5

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Valuation Approach for Assessing Efficiency of Agricultural Land Use

Abstract: This article is devoted to studying the peculiarities of applying the valuation approach toward assessing the efficiency of agricultural land use. In particular, it was determined that the main link of the valuation approach was the value of the land use. Value is the basis of quantitative correlation under the equivalent exchange; the value of land use can be determined by applying three common approaches: comparison, cost, and income. The authors of the research present a methodology for assessing the value of the right to manage agricultural land use and its efficiency. The work supplies the calculated book value of land use under the actual status of agricultural lands in Ukraine according to the average indicators (in the present research, this was the period of 2017–2021) and the economic market value of land use while considering innovative investments in land improvement that are focused on establishing the more effective use of agricultural lands. It is stated that the valuation approach toward assessing the efficiency of agricultural land use can be used to specify the value of the right to manage land use in the amount of its general value as well as assess its efficiency. The suggested algorithm and statistical indicators were used to calculate the right and efficiency of agricultural land use management for all categories of farms and, particularly, in terms of agricultural enterprises of the different forms of economic activity.

Keywords: value of agricultural land use, economic value added, book value, grain equivalent, assessment of efficiency, capitalization rate

Received: October 11, 2024; accepted: January 2, 2025

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1. Introduction

Innovative transformations in the economy, the integration of Ukraine's economy into world markets, and the establishment of new economic relations require new models of the relationship of the right of management and the criteria of assessing its efficiency [1].

One of the modern concepts of value assessment involves measuring the value growth and applying the valuation approach toward the management of enterprises and their land use. The Stern Steward company is among the leaders in applying this approach; it actively promotes a developed indicator called economic value added (*EVA*) in their methodology of company assessment [2–4].

The development of valuation models have happened along with improving the system of management and the planning progress in information technologies. The valuation approach toward managing the efficiency of an enterprise's operation is based on an integrated financial indicator; namely, the value of an enterprise (in the current case, this is the agricultural land use of the enterprise).

Managing the values of companies (VBM – value-based method) is a complex process that is grounded on the principles of economic profit and a special financial model that contribute to making proper operational, production, and strategic decisions. Therefore, managing the value of an enterprise considers a complex of managerial, financial, and market factors.

Economists T. Copeland, T. Koller, and J. Murrin proposed a more effective approach for identifying the factors of value that was based on the calculation of the index of value as the discounted money flow of a company [5]. This approach is focused on assessing the efficiency of the company's performance (including its management) and considers the many factors of both the internal and external environments that influence the results of its activities. They proposed specifying the factors of this value and identifying them as indicators of efficiency for different departments. It is possible within the framework of building a system that is able to monitor changes in the value, whereas it is difficult to identify the value factors that refer to all levels of the organization because of its recording of only financial indicators.

Under the current conditions of land management in Ukraine, land is one of the most complex objects of assessment in the structure of the property complexes of agricultural enterprises. Such a situation has been forced by some factors; namely, the specificity of the object, the underdeveloped and imperfect regulatory base, and the insufficient development of the land market in the country [6–8]. The practices of the previous decades have shown that a lack of assessing the value of the right to manage land use has resulted in the inefficient employment of agricultural lands [9]. In other words, the main goal today is to maximize the market values of enterprises [10–13]; in the present case, this is the agricultural land use of an enterprise.

The aim of this study was to introduce a methodological approach for evaluating land use management rights and their effectiveness by measuring the economic

added value that is created as a result of management decisions concerning land improvements.

The objective was to foster the more efficient and environmentally sustainable land use through the implementation of this methodological framework.

2. Materials and Methods

The theoretical and methodological bases of the research were provided by the scientific fundamentals and principles of the methodology of assessing the value of land use and the cost approach (which have been studied in the works of domestic and foreign scientists). Key aspects of the valuation approach application include assessments, identifications, and controls for changes in the values of enterprises, whereas traditional methods of business valuation have mainly provided only momentary results and have not involved a continuous monitoring of a situation.

A classification of the methods of the valuation approach is presented in Figure 1.

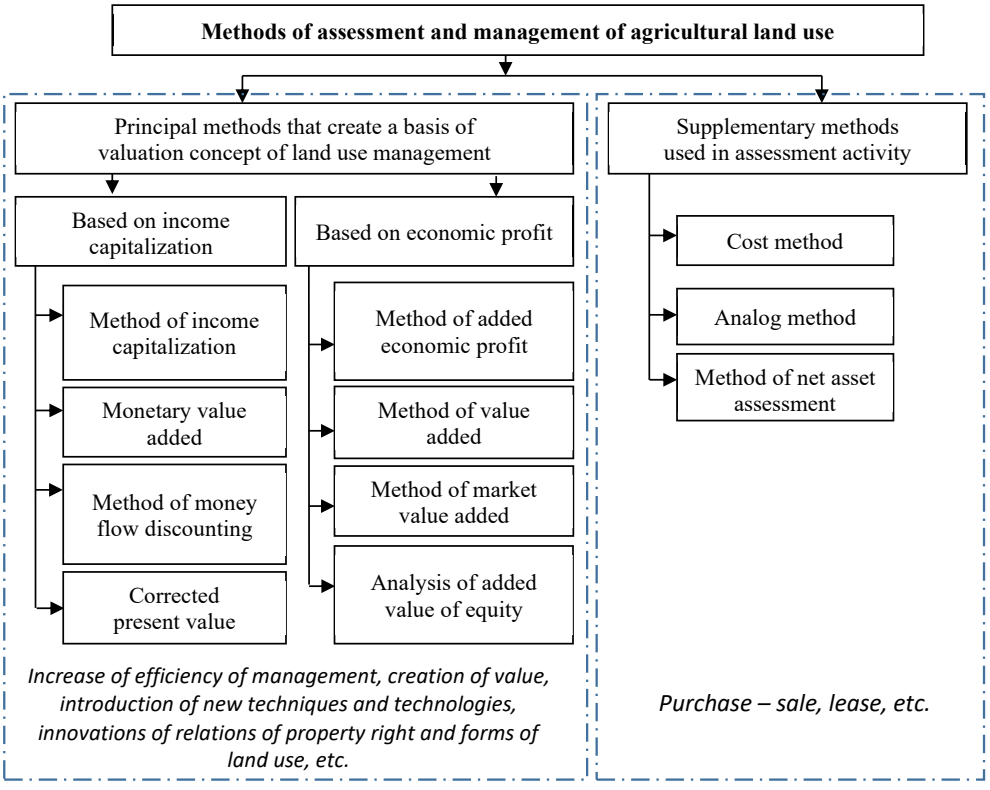

Fig. 1. Classification of methods of valuation concept

This is characterized by the connection of each method to either economic value added or money flow discounting.

A complex use of the proposed methods of assessing the value of the right to manage land use can be applied to assess the results of the operations in the retrospective variant; thus, they have shaped the basis for making managerial decisions that are focused on increasing the value of land use and its efficiency (particularly agricultural land use).

The criterion of efficiency for the valuation approach indicators is represented by the available absolute growth of a positive economic value added. The indicator of the economic market value of agricultural land use is considered as the added value of the capital that is invested in land improvements minus the actual book value of the agricultural land use. The book value of agricultural land use is viewed as the value of the actual status of the lands.

The methodological approach toward assessing the value of the right to manage agricultural land use and its efficiency is revealed in the measuring of the economic value added that is obtained due to managerial actions under the actual employment of lands or under more efficient and environmental-friendly land use.

The methodology for assessing the value of the right to manage agricultural land use is expressed by the following formula:

$$VRMl = BVl_t - BVl_a \tag{1}$$

where *VRMl* is the value of the right of land use management, BVl_t – the book value of the land use under the actual status, and BVl_a – the book value of the land use under the actual status while considering the average indices for the previous five years.

The indicator of the efficiency of agricultural land use management is equal to the economic value added that is obtained as the difference between the book value of the better and more efficient use of land of the corresponding business entity and the average book value of the land use over the previous five years.

The methodology for assessing the efficiency of agricultural land use management is calculated by the following formula:

$$EMl = EMRl - BVl_a \tag{2}$$

where *EMl* is the efficiency of the agricultural land use management, *EMRl* – the economic market value of the land use considering the innovation and investment capital in land improvement as to achieving the better and more efficient use of lands and other natural resources, and BVl_a – the book value of the land use under the actual employment of the land and other natural resources while considering the average indices over the previous five years.

The book value of the land use under the actual status is assessed by considering the average indices by the capitalizing the income that was obtained from growing agricultural crops and by applying the grain equivalent (Y_{ge}).

The calculation of the book value of agricultural land use involves performing some actions – particularly, the following [14]:

- identification of initial data – yield of agricultural crops, cropping area, and costs of their growing and selling prices;
- calculation of grain equivalent (income in terms of grain) (Y_{ge}) in centners (centner [quintal] = 100 kg) per hectare;
- calculation of net income per 1 ha with consideration of index of grain equivalent (*NI*);
- calculation of book value or other value of land use by method of capitalization of net income calculated by applying method of grain equivalent.

To measure the net income on the basis of gross income and standard costs while considering the grain equivalent, it is necessary to calculate the following [14]:

- gross income (*GI*) by grain equivalent

$$GI = Y_{ge} \cdot P \tag{3}$$

where Y_{ge} is the yield of the agricultural crops in the grain equivalent [centner/ha], and P – the average selling prices of the agricultural crops [UAH/centner];

- standards of costs (C_s) by grain equivalent

$$C_s = \frac{C_a}{Y_a \cdot Y_{ge}} \tag{4}$$

where C_a is the actual costs of the agricultural crops growing [UAH/ha], and Y_a – the actual yields of the cereals and legumes [centner/ha];

- calculation of net income (*NI*) by grain equivalent per 1 ha of cropping area

$$NI = GI - C_s \tag{5}$$

where *NI* is the net income by the grain equivalent [UAH/ha], *GI* – the gross income by the grain equivalent [UAH/ha], and C_s – the actual costs by the grain equivalent [UAH/ha].

The book value of the land use (*BVl*) is calculated by the method of capitalizing the net income by applying the grain equivalent:

$$BVl = \frac{NI}{R_c} \tag{6}$$

where *BVl* is the book value of the land use [UAH/ha], *NI* – the net income, and R_c – the capitalization rate.

Thus, the capitalization rate (R_c) is determined by the method of cumulative construction using the following formula:

$$R_c = RFBR \pm \sum R \tag{7}$$

where *RFBR* is a risk-free basic rate that is determined by the rate of the annual foreign currency deposits that is set by the commercial banks [%], and $\sum R$ – the risks [%].

The information basis of the research was made by the regulatory acts of Ukraine, official data from the State Statistics Service of Ukraine in the Lviv region, State Service of Ukraine for Geodesy, Cartography and Cadastre, scientific works of foreign and domestic researchers on the issues of assessing the value of the right to manage land use and its efficiency, the development of new models of the relationship of the right of management as well as the criteria of its efficiency, and the results of the authors' personal studies [15–17].

The authors' findings were significant for assessing forecast accuracy indicators such as MAPE and BIC; they also emphasized the importance of restoring hidden data and utilizing economic methods in order to evaluate the land profitability for agricultural landowners. This approach could help enhance agricultural production and contribute to food and environmental security. Furthermore, the authors investigated methods for evaluating the effectiveness of the relative legislative acts and their practical impacts on social relations. The present research employed various scientific and methodological approaches.

3. Results and Discussions

In the research, it was important to select the factors that created the value of the agricultural land use as well as ways to study the mechanisms of their impacts on the dynamics of its value under the conditions of an unstable external environment that is influenced by innovative processes [18, 19].

To solve the described problem, one can create a model of the process of forming the market value of the companies while considering any changes of the factors of the external and internal environments. Thus, this necessitates making complex decisions – both in the theoretical and practical aspects.

Particular attention should be paid to the level of innovative development and its impact on the value of the agricultural land use, which involves extending the existing approaches and developing new ones in order to assess the efficiency of the managerial work of the land users and the criteria of the agricultural land use assessment.

It is reasonable to define the arguments that are used to justify applying the value of the land use as one of the main factors for enhancing the level of its innovative development:

- assessing value of land use correlates with such target functions as risk and profitability, enabling complex assessment of efficiency of approved managerial decisions;
- value can be calculated for all land uses;
- criterion of value of land use is focused on strategic business goals – maximizing value (i.e. raising profitability and reducing risk) requires focusing on demands of customers, which contributes to increased competitiveness of land use and permanent innovative development;
- value of land use is universal criterion for determining structure of types of property rights – particularly, right of management by owners [20, 21].

It is known that the financial market responds to changes in the value of the land use much faster than it does to changes of profit; this means that the value is the best reflection of the land owners' interests. Using value as a target function of innovative development management contributes to reductions in the conflicts of interests of all of the participants of the land relations and territorial communities as to the revenues to the local budgets.

Nowadays, the most-used concept within the framework of the valuation approach is the concept of economic value added (*EVA*). In this case, the growing efficiency is viewed as the excessive profitability of the employed capital over the cost of its involvement.

Introducing the system of management on the basis of the *EVA* measure has resulted in distinguishing so-called 4Ms; these are the priority directions of the model's use [22]: After introducing the *EVA*-based management system, four priority directions for utilizing the model have been identified [22]:

1) Measurement – the proposed system of assessing a company's performance is the most-precise manifestation of its actual profitability.
2) Management system – this covers a complex of managerial decisions on strategic planning, purchasing and selling assets, placing capital, and determining goals.
3) Motivation – a system of rewards that are based on *EVA* measurements combines the interests of managers and shareholders.
4) Mindset – introducing a system of management and rewards that is based on the indicator results in transformations in the corporate culture.

Within the valuation approach, methods of assessment can be applied separately for each specific land use or innovative project based on the monitoring of each stage of the value-formation (in the present case, it is agricultural land use). The economic characteristics of the considered methods and the evolution of the approaches

justify the opportunity to add some assessment criteria (and their consistency) when determining the different types of value.

It is also necessary to consider that managerial accounting and control of the results of an enterprise's performance should differ by the level of its management and the centers of its value [23].

In practice, rights are normally not assessed as being factors of value growth. The organization and economic mechanism of managing land use value (particularly, agricultural land use) is not always perfect. The results of the work are mainly considered on the basis of the financial parameters that are founded on the data of the accounting reports. Such indicators are viewed as overdue ones, while investors mostly focus their attention on future results. Financial information in this case does not always objectively demonstrate the future conditions of land use (particularly, agricultural land use) because it does not consider the potential factors of the value increase. Apparently, there is a necessity to increase the accuracy of forecasts as to the profitability and risks of land use when making objective managerial decisions.

Under the current economic conditions, the methods of innovative management should take the impact of the external environment of the land use, the transformations in the structures of the investments, and the intellectual constituent of the land capital of the land use into account. Thus, the traditional methods of assessing investment efficiency are insufficient for a complete analysis of the economic efficiency of land use (particularly agricultural land use).

The methodology for assessing the value of land use is based on the theory of economic analysis and the principles of corporate finance (such as the neutralization of the excessive profit, the measurement of the investment value, the decomposition of the economic profit, the assessment of the actual value of business, etc.). Thus, it is possible to implement the directions of land use based on the economic value added while accounting for uncertainty and risk. Economic value added (*EVA*) is calculated by the following formula [22]:

$$EVA = NOPAT - CC \cdot NOA \tag{8}$$

where *NOPAT* is the net operational profit, *CC* – the value of the capital, and *NOA* – the net operational capital.

However, the system cannot be equally efficient for all of the goals and conditions of the environment. In the case when results and resources are real and the accounting of them is available, assessing the efficiency should involve some objective constituent. The decisions will be proper when the set goals are compared to the objective demands and opportunities of the system.

The availability of the absolute growth of positive economic value added is the criterion of efficiency for valuation-approach indicators. The indicator of the market value of an enterprise is viewed as the value of the capital that is integrated in the enterprise minus its debt financing plus its discounted flow of economic profit. For consumers, the

enterprise's value is considered to be the reported costs of its excess consumers; thus, the valuation approach helps identify any actual market compromises.

The indicator of the economic value added of land use characterizes the economic profit that is obtained by the land use as well as the excess of the residual income over the alternative costs from the capital that is attracted to the land use. Economic value added reflects the quality of managerial decisions and assesses the excess market value of the land use that is created by innovative investments. A negative value of the indicator proves a reduction in the market value of the land use.

The decomposition of the indicator *EVA* on different factors helps assess the efficiency of some kinds of rights of land ownership; thus, the indicator of economic value added can be incorporated into the system of control and motivation of land use and, therefore, contribute to making objective managerial decisions.

The indicator of economic value added determines the behaviors of owners and land-users in terms of the innovations and investments of funds in the land use.

The researchers studied the main values of the indicator (*EVA*) and compared them with the behaviors of the owners and users of agricultural lands [2, 22, 23]:

- $EVA = 0$ – this means that the market value of the land use is equal to its book value. In this case, the owner's or user's market profit will be equal to zero if he/she invests in land use.
- $EVA > 0$ – this means an excess of the market value over its book value. In this case, it is more beneficial for the owner or user to further invest in improving the land use.
- $EVA < 0$ – this causes a reduction of the market value of the land use. In such a situation, the owners or users lose their invested capital because of the losses of alternative profitability.

The valuation right of the management of land use should be considered to be a complicated relationship (like a system). The system should be viewed as the many relationships of the objects and resources that are organized by the process of the system's genesis into a single entity (and are likely opposed to the environment or supersystem). In a system's analysis, the system is defined as a complex of entities (objects) as well as the relationships among them; it is specified in the environment for certain time and for a certain purpose. Thus, the value of the right to manage agricultural land use can be described by the following sequence of stages:

- collection and analysis of basic information about land use and, generally, market;
- formation of desired model of land use and determination of values of operation indicators;
- substantiation of main pricing factors that create value of land use and determination of degree of their impacts on value measure;
- assessment of value of enterprise;
- estimation of potential of land use and formation of strategy of its development.

However, the main link of the value of the right of management is the value of agricultural land use. Value is viewed as the basis of quantitative correlation under an equivalent exchange. The value of land use can be assessed by applying the following three common methods:

The comparison approach is established on the principle of substitution according to which a buyer does not pay more for the land use than the value of the similar land use on the market. This approach can hardly be applied in the practice of the domestic economy: first, this is because of the underdeveloped market of the agricultural land use in Ukraine; second, similar land uses can rarely be found; and third, there is little information about the agreements on the purchases of agricultural land uses.

The cost approach is based on the assumption that land use corresponds to the expenditures that were experienced by the land owner or land user of the right of management. The measurement of the value of the personal capital aims to calculate the market values of the land assets of the land use.

The income approach is grounded on the assumption that a smart buyer (investor) does not pay more for land use for a real estate object than he/she can obtain in the future in the form of net income. The advantage of this approach is in its consideration of the prospects and future conditions of the land use's performance (the conditions of its product pricing, future land improvements, conditions of the market when it performs, etc.) as well as the forecasts of its development.

Thus, **the valuation approach** for assessing the right to manage land use is relatively new; this has long been merely a tool of management at stock exchanges and has not been used in the general system of management.

Among the standards of assessment activity, there are several kinds of asset values (including land values). From the position of the valuation approach when referring to the right of land use management in the context of its economic efficiency, these can be grouped into any of the following: substantiated market value, economic market value, book value, liquidation value, deposit value, and reproduction value. These can be separately distinguished; a few are considered in more detail below.

Substantiated market value. The value of one's assets is determined as the amount of money that a buyer is willing to pay during a certain period in exchange for expected money flows in the future. Assessors identify the value of an operating enterprise as a variant of its substantiated market value; it is expected that, when the land use generates money flows, buyers should assess them in order to measure its value in total by applying specially developed methods. This variant should be reasonably used for a comparative analysis. There is a variant of measuring the market price at which assessment objects are sold in an organized stock market. The market price is often determined in the agreement; this represents an agreement between two or more parties at a certain moment. In spite of some volatility, market value is a reliable criterion for measuring the value of the assets.

Economic market value. Economic market value is viewed as the value of one's assets under a project managerial decision of better and more effective land use.

Book value. Book value is the price of one's assets at which they are registered in the balance according to the general principles of accounting. Nowadays, the active standards and rights in Ukraine do not provide an appropriate definition of the book value of agricultural land use. By studying the Standard of Accounting Seven Fixed assets [24] and Standard of Accounting Eight Intangible assets [25], it is determined that the purchased (created) fixed assets and intangible assets are recorded in the balance of an enterprise at some price. The International Standards of Accounting 16 (ISA 16) Fixed assets and International Standard of Accounting 38 (ISA 38) Intangible assets provide a definition of the book value as the price at which one's assets are fixed after subtracting the amount of depreciation and accumulated loss because of the reduced usefulness [26, 27]. Nevertheless, there is no approved procedure of measuring the book value of land use today (particularly, agricultural land use).

It is necessary to mention such directions of any analyses of the approaches to assessments as considerations of any risk, profitability, and opportunity to study any financial decisions. It is also reasonable to note the range of each approach application that models the process of the formation of the market value of companies with considerations of changes of the external and internal environment factors.

The grain equivalent (Y_{ge}) is a complex indicator that is calculated by comparing the index of the net income of one's assessed crops while referring to the net income that is obtained from one's cereal production. The assessed crops are those that are grown on the area of Ukraine and take the largest share in the structure of the cropping area. The grain equivalent is determined by the value of the lands and expressed in the conditional output of grain per 1 ha (or in UAH). This is a complex indicator that involves the yield capacity and assessment of the land's suitability for growing main agricultural crops, the costs that are spent for producing them, and the improvement of soil fertility. When determining the grain equivalent, the following aspects should be considered [14]:

- income from production of assessed crops with consideration of their average selling price,
- difference in profitability of each crop in reference to profitability of cereals,
- total of specific weights of crops in structure of cropping area,
- indices of differences in costs spent for maintaining soil fertility and treatment of 1 ha of cereals.

The price of the grain is subtracted from the mentioned amount that is obtained as a product of the value of the standard yield of the grain and the difference between the regional price of the grain and the weighted average price in Ukraine. The obtained results are transferred into the volume of the grain by the average selling price of wheat and are added to the indicator of its standard yield. Finally, the yield is expressed in the grain equivalent (Y_{ge}). The obtained results of the grain equivalent

by the indicators at the date of our assessment by the average indicators (for the period of 2017–2021) while considering the innovative investments (e.g., the introduction of a new and more productive crop [i.e., soybeans]) are supplied in Table 1.

Table 1. Calculation of grain equivalent

Crop	Actual yield (Y_a) [centner/ha]	Cropping area [thousand ha]	Average selling prices [UAH/centner]	Gross output per 1 ha	Actual cost [UAH/ha]	Net income [UAH/ha]	Difference in income from cereals [UAH/ha]	Share of crop in structure of cropping area	Difference in income with consideration of structure of cropping area [UAH/ha]
At of assessment date in Ukraine (2021)									
Cereals and legumes	53.9	15,995	629.6	33,935	9034	24,901	0	0.65	0.0
Sugar beets (commercial)	479.1	227	116.4	55,767	32,423	23,344	–1558	0.01	–14.4
Sunflowers	24.6	6622	1641.8	40,388	9249	31,140	7796	0.27	2099.9
Potatoes	166.4	1283	499.3	83,084	773	82,310	51,171	0.05	2670.5
Vegetables	215.4	454	467.9	100,786	4644	96,141	13,831	0.02	255.4
∑	–	24,584	–	–	–	–	–	–	5011.5
Income in terms of grain is equal to 5011.50/629.60 = 8.0 centner/ha									
Y_{ge} = 53.90 + 8.00 = 61.90 centner/ha									
By-average indices in Ukraine (2017–2021)									
Cereals and legumes	47.08	15,234	460.9	21,698	9219	12,479	0	0.65	0.0
Sugar beets (commercial)	467.96	252	87.2	40,828	32,500	8328	–4151	0.01	–44.6
Sunflowers	22.72	6232	1080.8	24,557	9368	15,188	6860	0.27	1820.9
Potatoes	163.34	1312	452.2	73,869	717	73,152	57,964	0.06	3238.7
Vegetables	211.80	446	443.9	94,027	4284	89,743	16,591	0.02	315.0
∑	–	23,478	–	–	–	–	–	–	5330.0
Income in terms of grain is equal to 5330.00/460.90 = 11.60 centner/ha									
Y_{ge} = 47.08 + 11.60 = 58.60 centner/ha									

Table 1. cont.

With consideration of innovative investments in Ukraine									
Cereals and legumes	53.9	13,790	629.6	33,935	9034	24,901	0	0.60	0.0
Sugar beets (commercial)	479.1	230	116.4	55,767	32,423	23,344	–1558	0.01	–15.6
Sunflowers	24.6	4597	1641.8	40,388	9249	31,140	7796	0.20	1559.0
Potatoes	166.4	2528	499.3	83,084	773	82,310	51,171	0.11	5627.5
Vegetables	215.4	1379	467.9	100,786	4644	96,141	13,831	0.06	829.7
Soybean	214.3	460	444.8	95,321	3835	91,486	–4656	0.02	–93.2
∑	–	22,987	–	–	–	–	–	–	8000.7
Difference in income in terms of grain is equal to 8,000.70/629.60 = 12.70 centner/ha									
Y_{ge} = 53.90 + 12.70 = 66.60 centner/ha									

The initial data that was used for calculating the grain equivalent, the book value of the land use under the actual status, and the average indices included statistical data from the State Statistics Service of Ukraine and reports on the main economic indicators of agricultural enterprise operation for the period of 2017–2021.

The risk-free basic rate is a typical interest rate on reliable deposits in foreign currency that is provided by the leading commercial banks of Ukraine. In this case, the risks include the following (Table 2):

- differences in liquidity of deposits made in land use and banking institution,
- probability of underpayment of profit and non-repayment of invested funds according to specific placement of capital,
- compensation for quality of management that is related to competence in certain economic situation; other specific risks.

Table 2. Calculation of capitalization rate

Title of rate and compensation	Rate value [%]
Risk-free basic rate (average deposit in banks of Ukraine)	15
Compensation for difference in liquidity of investments in land use	2
Compensation for probability of underpayment of profit and non-repayment of invested funds according to specific placement of capital	2
Compensation for quality of management that is related to competence in certain economic situation	1
∑	20

According to the above-mentioned information, the authors calculated the book value of the land use at the date of assessment by the average indices (the data that was taken for the five-year period) and with consideration of the innovative investments in land improvement that focused on achieving the efficient use of agricultural lands (Table 3). Thus, the book value of the land use for all of the categories of agricultural enterprises accounted for 142,893 UAH/ha in Ukraine in 2021. According to the average indices for the five years (2017–2021), the book value of land use for all of the categories of agricultural enterprises was at a level of 77.720 UAH/ha in Ukraine. The economic market value of the land use while considering the innovative investments in land improvement focused on achieving the better and more efficient use of agricultural lands was at a level of 153,860 UAH/ha for all of the categories of agricultural enterprises in Ukraine.

Table 3. Assessment of book value of agricultural land use [UAH/ha]

Book value of land use	*GI*	C_s	*NI*	*BVl*
Under use of agricultural lands of Ukraine in 2021	38,967	10,368	28,579	142,893
By-average indices of using agricultural lands in Ukraine (2017–2021)	27,027	11,484	15,544	77,720
With consideration of innovative investments in land improvement focused on achieving better and more efficient use of agricultural lands	41,936	11,164	30,772	153,860

According to the set algorithm and statistical indicators, similar calculations were performed for the Lviv region – particularly, under the actual use (for the period of 2017–2021) and while considering the innovative investments. Such calculations were done for all of the categories of agricultural enterprises as well as in terms of agricultural enterprises of different forms of economic activities.

By applying the presented calculations, the authors assessed the value of the right to manage land use and its efficiency for Ukraine and the Lviv region (Table 4).

Table 4. Assessment of right to manage agricultural land use and its efficiency [UAH]

Land use	Land use value			Assessment of right of management (*VRMl*)	Efficiency of land use management (*EMl*)
	Book value under actual use at date of assessment (BVl_t)	Economic market value of land use (*EMRl*)	Book value by-average indices for previous five years (BVl_a)		
Ukraine	142,893	153,860	77,720	65,173	76,140
Lviv region:					
– all farms	154,200	169,909	104,614	49,586	65,295
– agricultural enterprises	141,350	156,430	90,018	51,332	66,412
– farming enterprises	130,986	151,727	72,192	58,794	79,535

By analyzing the presented indicators, the authors provided a substantiated conclusion that the valuation approach toward assessing the efficiency of agricultural land use should be applied to specify the value of the right of management in the total value as well as to assess its efficiency. For instance, the value of the right of management in all of Ukraine is higher than it is in the Lviv region; therefore, it is necessary to improve the process of making managerial decisions on the land use in the region as well as to develop a complex of measures that are focused on increasing the economic value added due to the implemented managerial actions. The data from Table 4 shows that, under a higher value of the right to manage farming enterprises, the efficiency of their land use is also higher.

4. Conclusion

In Ukraine, there is a lack of established methodologies for evaluating the rights that are associated with land management and the efficiency of land use that adhere to contemporary standards and regulations. The authors of this research have proposed a new methodology, along with a classification of the valuation methods.

It is advisable to utilize the economic value-added indicator as a means to effectively manage the value of land use.

The authors have also calculated the book value of land use under the actual employment of agricultural lands according to the average indices (for the period of 2017–2021) while considering the innovative investments in land improvement that are focused on achieving the better and more efficient use of agricultural lands for all categories of enterprises.

According to the approved algorithm and statistical indices in Ukraine and the Lviv region, the authors have determined the book values of the land use of all of the categories of enterprises (particularly, agricultural enterprises) of the different forms of economic activities. Based on the provided calculations, it was confirmed that the capitalization of the land use due to the right of management is higher in Ukraine than it is in the Lviv region; therefore, it requires improvements in the managerial decisions as to the use of lands in the region. It is was proven that, among the compared indicators, the studied one was higher at farming enterprises; this confirmed the fact that the best actual uses of the lands were among the other agricultural enterprises.

The potential for achieving more-efficient and environmentally friendly land use was supported by the calculations regarding land use management efficiency. The research indicated that investing in innovative land improvement initiatives can lead to increases in this efficiency, support informed managerial decisions, and enhance the economic value of land use. The authors emphasized the need to develop a comprehensive set of measures that are aimed at increasing the economic added value through effective management actions.

This study has highlighted the importance of analyzing valuation approaches by considering factors such as risks, profitability, and the impacts of financial decisions. It has also emphasized the relevance of understanding the application scope of each approach (as was noted by the researchers in the referenced source [28]). To address the identified challenges, it is advisable to model the process of determining the market values of companies while accounting for changes in both external and internal environmental factors. This approach can help justify the necessity of making well-rounded decisions in both the theoretical and practical contexts.

Funding

The article was prepared under the research subvention of AGH University No. 16.16.150.545 and under the research subvention of Lviv National Environmental University.

CRediT Author Contribution

O. K.: conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing – original draft preparation, writing – review and editing, visualization, supervision, project administration, funding acquisition.

M. B.: methodology, validation, formal analysis, investigation, data curation, writing – original draft preparation, writing – review and editing, visualization, supervision, funding acquisition.

N. T.: conceptualization, methodology, formal analysis, investigation, writing – original draft preparation, visualization, supervision.

O. K.: conceptualization, methodology, formal analysis, investigation, writing – original draft preparation, visualization, supervision, funding acquisition.

L. P.: methodology, formal analysis, investigation, writing – original draft preparation, visualization.

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Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Calculations based on open data, sources: [29–32].

Use of Generative AI and AI-Assisted Technologies

No generative AI or AI-assisted technologies were employed in the preparation of this manuscript.

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