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ANALYSIS OF LAND USE COEFFICIENTS IN NORMATIVE VALUATION

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Abstract: *The basic market principles of land value formation embedded in the normative land valuation of land plots and the land use coefficients were analyzed to assess their compliance with actual price-forming factors on land market. Various approaches to land taxation were examined, including a comparison of normative land valuation and mass land appraisal, with the advantages and disadvantages of each approach described. A study was conducted on land functional use coefficient (Kfu) impact in the normative land valuation within an urban areas. The rent levels of commercial and residential properties on similar land plots in urban areas were analyzed. Based on the research conducted in this work, the discrepancy of the Kfu with market conditions of land value formation was justified. A graphical visualization of land use coefficients impact on land value according to the normative valuation was constructed, using Lviv as an example, and these data were compared with the graphical visualization of W. Alonso's Bid-Rent classical theory of land value formation in urban areas. The feasibility of further using normative land valuation for taxation purposes was substantiated, provided that the set of coefficients is aligned with real market parameters.*

Keywords: *normative valuation, mass appraisal, land plot, normative valuation coefficients.*

Formulation of the problem. The discrepancy between normative land valuation (NLV) results and market land prices has always been and remains one of the reasons hindering the economic development of the country throughout its modern history. Since NLV serves as the basis for land taxation and land rent calculation, its difference from market valuation causes significant disparities in land rent for different land owners and land users compared to the actual rent derived from the use of land. Thus, land taxes and land use fees are unjustly low for some and unjustly high for others. Despite the long-standing practice of using NLV, it needs updating and alignment with real market value to ensure more effective land fee assessments.

Analysis of the latest scientific research and publications. The issue of normative land valuation has been studied by various experts and scholars, including Yu.F. Dekhtiarenko, Yu.M. Mantsevych, Yu.M. Palekha [2-3, 11], V.O. Voronin, E.V. Liantse [1], A.O. Koshel [6-7], A.H. Martyn [13], I. Antypenko [14], I.V. Koshkalda, T.V. Anopriienko [8], A. Samoilova, Ye. Ivanov [16], A.M. Tretiak, V.M. Tretiak, A. Volska [17], A.S. Yukhno, V.P. Pohoida [18], I.H Kolhanova, A.A. Vysidalko [5], O.V. Kustovska, V.V. Bondarchuk [9], N.V. Zhmur, V.P. Bokovenko [4], Y.M. Dorosh, A.V. Tarnapolskyi, A.I. Dorosh, O.S. Dorosh [15]. Although there are many publications on this issue, the topic of normative land valuation remains relevant for further research. This is due to constant changes in legislation, technologies, and new challenges that arise before municipal goverments in Ukraine. Research in this field contributes to the improvement of the regulatory framework and enhances the efficiency of land resource management.

The purpose of the research. Analyze the land use coefficients in the normative land valuation for its alignment with market data.

Materials and methods of scientific research. The article analyzes the scientific works of leading experts and investigates the features of mass and normative valuations of land value, outlining their advantages and disadvantages. This study examines the

impact of land use coefficients in NLV on land value by constructing a graph of land values for different purposes, using Lviv as an example, and comparing it with the diagram proposed by W. Alonso. Additionally, an analysis of the rental income of commercial and residential properties on similar land plots in the central part of Lviv was conducted.

Research results and discussion. Market valuation of land plots involves estimating land value based on three classical approaches: comparative, income, and cost. For taxation purposes in the Western world, mass land appraisal is used, which is based on processing large amounts of market data about land value. In Ukraine, the basis for taxation is the normative land valuation (NLV) [10]. Although the NLV has incorporated all three main land valuation approaches and reflects the primary economic mechanisms of land value formation in urban areas, it has certain shortcomings that cause its results to differ from market data. NLV does not account for changes in the economy, particularly its evolutionary and innovative progress, which significantly alters the efficiency of capital invested in the infrastructure of urban areas depending on the level of added value in the national economy or individual agglomerations.

The price of land plots within urban areas is determined by three key factors that influence the amount of rent that can be obtained through their economic use. The first factor is the use of infrastructural improvements, which are usually located outside the land plot (roads, transport infrastructure, utilities, security services, healthcare facilities, etc.). The second factor is geographical location, which refers to how accessible key centers of economic activity are in terms of distance and time, important for the plot's use (residential, commerce, production, etc.), as well as major centers of institutional and public interests. The third factor is legal rights and restrictions concerning construction on the plot (zoning, maximum allowed number of floors, type of development, and intended use).

In this methodology, the value of infrastructural improvements is assessed by capitalizing the rental income derived from the costs of developing and equipping the territory of the urban area. This results in heterogeneity in costs across different districts

of the urban area, which, according to the NLV methodology, is corrected using additional coefficients.

Normative valuation includes consideration of spatial location through the application of specific coefficients for individual districts. However, the proposed coefficients may not correspond to actual market conditions, as they can change over time and depend on the level of development of urban areas, leading to additional errors in valuation. Additionally, the existing methodology currently does not account for the level of added value of the economy, innovation, or stagnation of urban areas. This, in turn, significantly affects the overall level of land and real estate prices. Moreover, the NLV does not regulate the components of spatial rights and construction restrictions. The absence of these indicators leads to a significant difference in land prices compared to the actual market value.

One of the significant drawbacks of this methodology is the inclusion of land use coefficients for land plots in the formula. It is assumed that these coefficients are not so much economic as political in nature, which is entirely justified for land with socially important uses, and their presence is a positive factor for the main, most common, and economically significant types of use (commerce, production, housing).

The suitability of each land plot for different uses largely depends on its physical characteristics and location. Different parts of urban areas attract various types of land use, a concept theoretically formulated by economist William Alonso in 1970 [19]. He explained how different activities compete for land plots, whose value varies depending on their specific features. For example, commercial use is often localized in city centers and along main transportation arteries, where high accessibility and large human traffic increase the potential for attracting customers, allowing commercial owners to pay higher prices for land. Manufacturing also requires access to markets and labor, but not as much as commercial real estate. Additionally, an important factor for manufacturing is the size of the land plot, as manufacturing facilities occupy significantly more space. Thus, they are often located in the middle part of the city. Residential properties are frequently

situated on the periphery, where conditions are better suited for housing, and land prices are significantly lower. This theory is visually represented by the graph of the distribution of the three main functions of land use within urban areas through market mechanisms of competition and the principle of best use, as presented by the authors of the article on rent theory for land plots (fig. 1) [20].

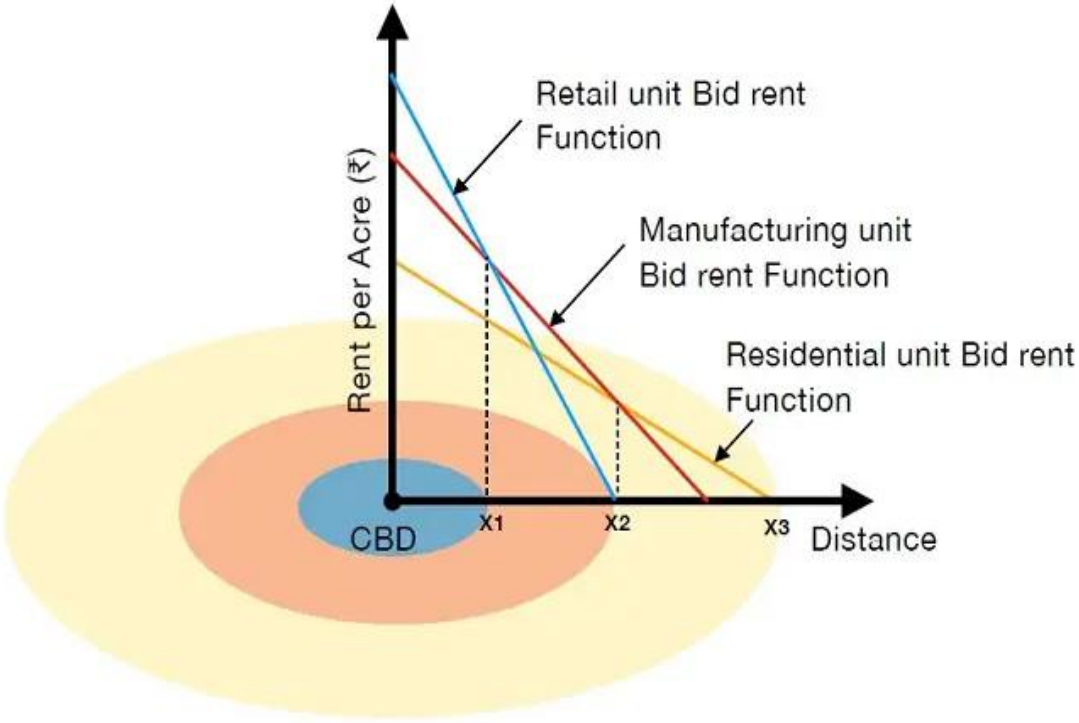

Fig. 1. Graph of the distribution of land use functions within an urban area through market mechanisms of competition [20]

The graph shows the rent functions of different types of activities projected onto a city model (illustrating the principle of competition among different land uses within urban agglomerations).

This is a simplified model in which the primary rent-forming factor is the distance to the city center. However, in the real world, the process of land rent formation depends on numerous economic and urban planning factors. According to this principle, each land plot within the urban structure has its greatest potential for a specific type of use, for which the rent will be higher than for other types (the principle of highest and best use), and it will attract such use unless there are changes in external conditions. Therefore, a proper

understanding and application of this principle can significantly enhance the effectiveness of urban planning and land management decisions.

Within the framework of this theory, it is worth examining the NLV to verify its compliance with the principles of competition among different land uses within urban agglomerations.

The NLV in urban areas is determined by the formula provided in the Methodology [10], calculated as the product of the land plot area, the normative of capitalized rental income and a series of coefficients.

In this work, attention is focused on one of these coefficients, namely the land functional use coefficient (Kfu), which is studied in two aspects: the appropriateness of its application as such, and the correspondence of its values in NLV to real market conditions.

To analyze Kfu in these two aspects, it is best to construct a graph showing the impact of the coefficient on the final land value. As an example, the regional center Lviv was taken, and the land value in different parts of the city along a diagonal from edge to edge through the city center was determined as of 2023. As a result, the following graph was obtained (fig. 2):

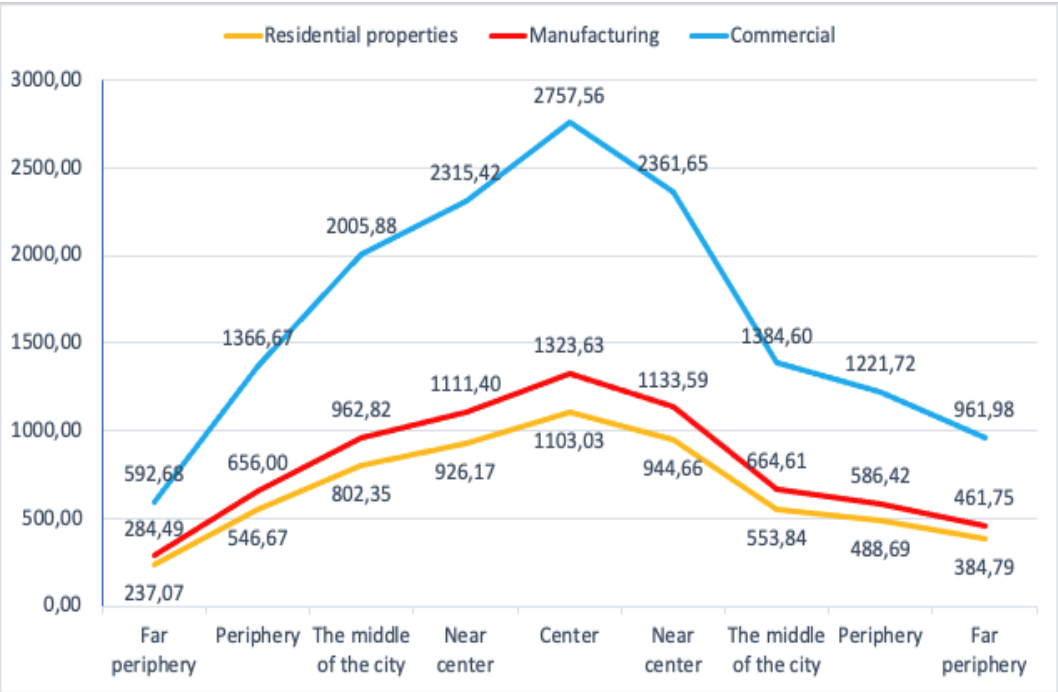

Fig. 2. Impact of the land functional use coefficient (Kfu) on land value according to NLV within an urban area. Source: developed by the authors.

The presented graph clearly illustrates the difference from the graph constructed according to Alonso's theory. **The rent functions of different types of activities according to the NLV methodology do not intersect due to the use of a constant coefficient, leading to an unfair distribution of land value in different parts of the city.**

To confirm these theoretical inconsistencies, a brief analysis of market rent levels for commercial and residential properties will be conducted and compared with NLV data.

For this purpose, a study of the profitability ratio of residential and commercial properties will be conducted to enhance the understanding of the real value of land as a component of an integrated real estate object for different types of use. The selection of this real estate segments are justified by several reasons. Firstly, residential and commercial real estate are the two most common types of land use in urban areas. Secondly, the structure and cost of development for these types, as well as their substitutability, are relatively similar compared to other types, such as industrial use, which significantly differs in nature and development cost. Due to their substitutability, the profitability of these two types of real estate will reflect the portion of profitability attributable to the land component in equal proportion. Thirdly, an initial market review indicates a less pronounced difference in profitability between residential and commercial properties than that suggested by the existing methodology. Fourthly, the availability, typicality, and volume of information in the market about rental levels of commercial and residential units do not pose problems for statistical analysis, unlike information about the sale of land plots, which are characterized by different levels of development and a set of legal rights and restrictions (which is reflected in the offer prices). Comparing information about the market value of land plots directly with the results of NLV will be the subject of future research. Fifthly, to confirm or refute the proposed assumptions, at this stage, a

superficial analysis of the profitability levels of these two types of use, which reflect the land plot value levels based on the residual principle, is sufficient.

For the analysis, information on the profitability (rental value) of real estate in the middle zone of the city of Lviv was selected, particularly in newly developed areas. This selection was made considering that other parameters, such as zoning, construction cost, and location, are comparable, except for the functional use of the properties. Market data on rental values were obtained from a reliable source in the Lviv region—a professional website that facilitates information exchange between realtors and real estate market participants [12].

For example, consider two properties of different use located in the same building constructed in recent years. The monthly rental cost of a 46-square-meter apartment is $490, while the rental cost of a 101-square-meter commercial space is $1,100. Thus, the average monthly rental rate for residential properties is $10.7 per square meter, and the rental rate for commercial properties is $10.9 per square meter. This trend is consistent when analyzing other properties in various parts of the city.

The obtained results demonstrate the absence of significant differences in the income levels of commercial and residential real estate in Lviv. Considering the main factors that determine land value and the fact that the land plots are in nearly equal conditions, it can be assumed that their value should be approximately at the same level. However, in the current NLV methodology, the land value for commercial properties is significantly higher, 2.5 times greater compared to the value of land for residential real estate.

From this, a preliminary conclusion can be drawn that although the normative land valuation (NLV) methodology is based on theoretical principles that logically correspond to the processes of land value formation in real market conditions, its existing theoretical shortcomings lead to a significant discrepancy between NLV results and market data. Therefore, the normative land valuation is an unfair basis for taxation of land, and does not reflect the real economic situation in land ownership and land use. The consequence

of such discrepancies is negative economic processes that can significantly hinder the country's economic development [2].

In this situation, the question arises: is it advisable to improve NLV to bring it closer to real-life conditions, or should mass land appraisal, as used in the West, be adopted instead?

To determine the most appropriate path for developing the land fee assessment base and priorities for Ukraine under current conditions, it is worth considering the strengths and weaknesses of NLV and mass land appraisal as the most common alternative in Western economies. The best answer can be provided by a SWOT analysis of these two main valuation approaches. The strengths and weaknesses of both proposed options are presented in Table 1.

Table 1. Advantages and disadvantages of market and normative land valuation

	Mass Appraisal	**NLV**
Key characteristics	The value are determined based on the analysis of actual market transactions, and it is reviewed in the event of significant market changes, with annual indexation. It typically requires the presence of qualified professionals within the municipal government.	The value are established based on normative data and is updated every 5-7 years with annual indexation. It is carried out by specialized organizations commissioned by local government bodies.
Strengths	1. The real state of the market is displayed. 2. An adequate fee for the use of the land is paid.	1. Low cost of development. 2. Not influenced by market conditions. 3. There are no difficulties in evaluating land that is not available on the market.

Weaknesses	1. Difficulties arise in the assessment of lands that are not in market circulation. 2. The cost of development and maintenance is expensive, because qualified processing of large volumes of data is required.	1. The real state of the market is not reflected. 2. Unfair distribution of the tax burden among land owners.

Source: developed by the authors.

Based on this comparison, it can be concluded that the main advantage of NLV is its relatively simpler and cheaper development. However, it has a significant drawback in the form of unfairness in land assessment due to the inaccuracy of its results.

To eliminate the mentioned error in the normative land valuation methodology, the following steps must be taken:

1. Review the appropriateness of using the land use coefficient Kfu, as it does not reflect the real value of land for specific types of use and is essentially a coefficient based more on political than economic grounds.

2. Reformulate the concept of value in NLV, where its basis will be the physical characteristics of the location, urban planning, and planning conditions, rather than the existing land use, as provided in the current NLV, which is not always the most effective (at least within urban areas).

3. Review the values of the normative capitalized rental income per unit area and all adjustment coefficients in accordance with market data.

This approach will ensure the valuation of land plots considering their real value, providing a more accurate alignment with theoretical pricing principles and allowing for a fair assessment of land.

Conclusions. In analyzing the theoretical foundations of market and normative land valuations, their advantages and disadvantages were identified. A significant discrepancy was found between the results of normative valuation and actual market prices, leading to unfair land assessment for taxation. The negative impact of this unfairness on the

economy, particularly on small and medium-sized businesses, is a potential subject for further research.

At the same time, NLV is a comparatively better method for land valuation as it incorporates fundamental, widely accepted valuation principles, making it a universal tool suitable for solving tasks of varying complexity and for making investment decisions. Therefore, the current methodology should be retained but certain components should be improved. In particular, to enhance the accuracy of land valuation results using the NLV methodology, it is necessary to review its coefficients and update their values with real market data, which will promote fairness and efficiency in land taxation.

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АНАЛІЗ КОЕФІЦІЄНТІВ ЦІЛЬОВОГО ПРИЗНАЧЕННЯ НОРМАТИВНОЇ ОЦІНКИ ЗЕМЕЛЬНИХ ДІЛЯНОК

Анотація: Проаналізовано базові ринкові принципи формування вартості, закладені в нормативній грошовій оцінці земельних ділянок та коефіцієнти цільового призначення на предмет їх відповідності реальним ціноутворюючим факторам на ринку землі. Досліджено різні підходи до формування бази оподаткування землі, зокрема співставлено нормативну грошову оцінку та масову оцінку земель, описано недоліки та переваги кожної з них. Проведено дослідження впливу коефіцієнту цільового призначення (Кцп) на вартість землі за нормативно грошовою оцінкою у межах населеного пункту. Проаналізовано рівні рентного доходу об'єктів комерційної та житлової нерухомості на схожих земельних ділянках населеного пункту. Опираючись на проведені у роботі дослідження, обґрунтовано невідповідність Кцп ринковим умовам формування вартості землі. Побудовано графічну візуалізацію впливу коефіцієнтів цільового призначення на вартість землі за нормативною грошовою оцінкою на прикладі м. Львова та співставлено ці дані з графічною візуалізацією класичної теорії формування вартості землі В. Алонзо. Обґрунтовано доцільність подальшого використання нормативної грошової оцінки для цілей оподаткування при умові приведення набору коефіцієнтів у відповідність з реальними ринковими параметрами.

Ключові слова: нормативна грошова оцінка, масова оцінка, земельна ділянка, коефіцієнти нормативної грошової оцінки.