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WAYS OF IMPROVING THE METHODOLOGICAL FRAMEWORK OF MASSIVE EVALUATION OF REAL ESTATE IN THE REPUBLIC OF MOLDOVA

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Abstract. This article focuses on researching the methodological development of real estate assessment in the Republic of Moldova, addressing the significant financial losses incurred by local public administrations due to the absence of an updated, appropriate, and transparent assessment system for taxation purposes. The fundamental hypothesis posits that enhancing the methodological and institutional framework of mass appraisal will lead to a progressive evolution of the real estate market relations and the stable development of efficient and equitable tax systems in Moldova. The study aims to identify and propose solutions to current issues in the national mass appraisal system, primarily related to the unavailability of market data and the use of outdated methodologies. Employing scientific techniques such as analysis, deduction, induction, grouping, comparison, analogy, scientific abstraction, synthesis, and statistical methods, the author assess the effectiveness of proposed methodological developments by comparing quality indicators of old assessment models with those developed based on the proposed methodologies. The results obtained support the idea of creating, implementing, and sustaining a mass appraisal system as a foundational element for a fair real estate taxation system, fostering regional development, and supporting economic activities related to the real estate market in the Republic of Moldova.

Keywords: *property valuation, property taxation, real estate economics, value modeling, regression.*

Rezumat. Acest articol se concentrează pe cercetarea dezvoltării metodologice a evaluării masive a proprietăților imobiliare în Republica Moldova, abordând pierderile financiare semnificative suferite de administrațiile publice locale din cauza absenței unui sistem de evaluare actualizat, adecvat și transparent în scopuri de impozitare. Ipoteza fundamentală presupune că îmbunătățirea cadrului metodologic și instituțional al evaluării în masă va conduce la o evoluție progresivă a pieței imobiliare și la stabilirea unor sisteme de impozitare eficiente și echitabile în Moldova. Studiul identifică și propune soluții la problemele curente din sistemul național de evaluare în masă, legate în primul rând de indisponibilitatea datelor de pe piață și de utilizarea metodologiilor învechite. Folosind tehnici științifice precum analiza, sinteza, inducția, deducția, gruparea, comparația, analogia, abstractizarea științifică, autorul evaluează eficacitatea dezvoltărilor metodologice propuse prin compararea indicatorilor de calitate ai vechilor modele de evaluare cu cele dezvoltate pe baza

metodologiei propuse. Rezultatele obținute susțin ideea creării, implementării și menținerii unui sistem de evaluare în masă ca element de bază pentru un sistem echitabil de impozitare a proprietăților imobiliare, promovând dezvoltarea regională și susținând activitățile economice legate de piața imobiliară în Republica Moldova.

Cuvinte cheie: *evaluare imobiliară, impozitare imobiliară, economie imobiliară, modelare valorică, regresie.*

Abbreviations

PIEF - Project of Land Registration and Evaluation.

Me - Median rate.

COD - Coefficient of dispersion.

PRD - Price Related Difference.

Rate (R) – report of indicators from different models.

1. Introduction

Currently, the market of real estate in the Republic of Moldova is in average stagnation, characterized by a lack of transparency, inconsistencies in the data from the real property cadastre, poorly developed institutional infrastructure. These problems are also reflected in a particular part of the assessment activity – the massive real estate valuation for taxation purposes. Having a special purpose, the activity of massive real estate evaluation is in the acute attention of the stakeholders in the results of the evaluation. On the one hand, the state, represented by territorial bodies, which monitor the dynamics of the real estate market, obtaining indicators to ensure the local budgets necessary for the management of the regions, on the other hand, civil society, having the role of taxpayers, respond to the reforms related to the changes made to the real estate tax and an additional wealth tax calculated on the basis of the value assessed by the real estate cadastre. A series of discussions and disputes arising in connection with the fulfillment of civil obligations to pay real estate taxes concern the calculation methodology and the principles used to assess the value of real property. All this is concentrated in the amount of taxes calculated on the basis of the estimated value in the mass assessment.

Having an experience of massive evaluation of some categories of immovable property for the purpose of taxation since the first decade of the current century, the tax authorities extend the calculation of the real estate tax on the base of the non-updated values from the primary massive evaluation. Another part of real estate is taxed based on the normative values established according to the indices combined from the 70s of the last century with some updating indexation. All this generates enormous losses in the budgets of local authorities, which in turn is reflected in the dynamics of development, the stagnant social and economic situation in the regions.

According to the relations in the real estate market, the level of awareness of citizens - subjects of the payment of real estate taxes - has also increased. This aspect is reflected in the emergence of new factors that affect the value of the property and its evaluation conditions. The old models used for the previous evaluation cause a number of problems that arise in their application, and the results obtained with the help of these models do not correspond to the current level and fluctuations of the real estate market. These problems have created tough conditions for the generation and implementation of new methodologies using modern mathematical and cybernetic modeling methods.

The establishment of an ad valorem property taxation system stands out as a prominent aspect of tax reform across numerous countries. The shift towards this new system is particularly pertinent in developing economies, that perceive the notions of "private property", "market relations" and "market value" as relatively new. In the present, a comprehensive tax reform is undergoing in Moldova, encompassing the adoption of a novel approach to real property taxation grounded in market value estimates for tax assessments. The ongoing implementation of a versatile real property cadastre system in the country assumes a crucial role, providing a robust foundation for tax assessment.

The real property tax stands as a crucial revenue stream for local budgets, particularly in countries with emerging economies. For example, in Moldova, property taxes contributed 8% to local government revenues, while central government subsidies provided 44%. In Lithuania, property taxes account for 10% of local revenues, but 60% comes from central government funds [1, p. 13]. Establishing an effective real property taxation system becomes pivotal for laying the groundwork for decentralized public governance. This tax allows local governments to capture a portion of the property value increments influenced by public expenditures. As highlighted by McCluskey, real property, being "visible, immobile, and a clear indicator of one form of wealth," becomes a tangible asset in this regard [2, p. 5]. Compared to other potential sources of local tax revenue, the real property tax proves especially attractive if administered adeptly, acting as an equitable and exceptionally effective fiscal instrument [3, p. 4].

Upon declaring independence and embarking on the journey to establish or reconstruct market economies, states in Central and Eastern Europe initiated comprehensive tax system reforms, encompassing the taxation of real property. This transformative process has been observed by scientists in various countries, including Slovenia, the Russian Federation, Belarus and Lithuania [4, p. 166].

The global landscape presents a diverse array of approaches to real property taxation. As it was classified by US appraisals, in several countries, the tax computation relies on the size of parcels and buildings, whereas in others, the assessment for taxation is grounded in the market value of both land and constructions [5, p. 30].

Systems based on property area offer the benefit of being administratively straightforward. Determining property tax according to area solely necessitates measuring the property's dimensions, eliminating the necessity for expensive data collection and market analysis, as well as revaluation processes. Moreover, measuring area is more objective compared to estimating the market value of the property, as assessors rely on comparable properties to form their estimations [6, p. 143]. Valuation methods centered on property area are thus less prone to dispute compared to those based on market values [7, p. 81].

The author draws upon property tax laws in the Republic of Moldova and various other countries, as well as economic literature pertaining to the topic, and data from the State Agency for Geodesy Cadastre and Cartography, as well as the State Tax Service of the Republic of Moldova. The issues under examination are partially addressed in the research conducted by scholars from the Republic of Moldova. Crucial elements of the evaluation process are investigated by T. Bajura and S. Popescu [8]. The efficient administration of real estate by local government bodies for the development of local budgets is explored in the studies of I. Paladi. Mechanisms and tools aimed at solving the problems of the agro-food sector as a whole, including taxation, infrastructure development, export promotion, government regulation of the market are researched by A. Muravschi [9]. The theory and

practice of real estate valuation are described in the works of O. Buzu, A. Matcov [10]. The practice of expressing the hypotheses of economic science through econometric models was developed by scholars S. Gorobievski and L. Dorofteeva [11]. S. Albu and I. Albu delve into modern evaluation theory, heritage management, and the utilization of databases in the real estate appraisal process within the context of Moldova's developing economy [12]. The factor analysis of the market value as a basic indicator of the national economy, as well as of social equity in the context of its use as the taxable base, is presented in the works of S. Albu, I. Albu and N. Țurcanu [13]. The sensitivity of land value depending on the economic and political situation is researched in the works of I. Botnarenco and I. Bratco [14], the methodology for calculating land with perennial plantations is proposed by T. Sanduța [15], as well as the value of land related to construction [16]. The problems faced by the countries that have explored the potential of introducing recurring property taxes based on value (Moldova, Poland, Serbia and Turkey) are researched by O. Buzu [17].

2. Materials and methods

At present, the Republic of Moldova is undergoing a transition from the previous method of property taxation, which relied on inventory value, to the new ad valorem system. This new system was introduced in Moldova in 2007, initially applying solely to residential properties in urban areas between 2007 and 2009. In 2010, the ad valorem tax was extended to include commercial and industrial properties, seasonal properties, and garages. By 2014, the assessment encompassed the primary categories of real estate with the greatest market worth.

The mass real property registration and assessment, which rely on property cadastre data, are closely intertwined with the implementation of the new property taxation system. As the mass registration of real estate properties progresses incrementally, the introduction of the new property taxation system also occurs gradually as part of this ongoing process (refer to Table 1).

Table 1

The bulk registration and evaluation of real estate alongside the implementation of the new taxation system

Type of Property	Quantity	Registration Period	Assessment Year	New Taxation System (year of implementation)
Apartments	335,000	2000-2002	2004	2007
Private houses in urban areas	180,000	2001-2003	2005	2007
Land plots and Sites with structures	80,000	2006-2007	2006-2007	2010
Garages	50,000	2006-2007	2006-2007	2010
Commercial and industrial property	90,000	Registration in process	2006-2009	2010
Agricultural plots	4,095,000	2000-2005	In progress	Not applied

In accordance with the Financing Agreement between the Republic of Moldova and the International Development Association of 17 September 2018, ratified in 2018 [18], for the period 30.08.2018-30.07.2024 in the Republic of Moldova, the Project of Land Registration and Evaluation (PIEF), the main objective being to improve the quality of the land administration and real estate evaluation systems and to strengthen the transparency of the real estate taxation system. Component B of the project covers Assessment and Taxation. This element will facilitate the extension of the mass appraisal system to incorporate properties currently not accounted for and to carry out a reassessment of properties that are already in the mass assessment system but have not been reassessed since 2008. In order to scientific research by the author used the market data, collected within this project. Systematized information about the market data used is placed in Table 2.

Table 2

Market data collected									
Period	Apartments	Apartments on the ground	Urban houses	Rural houses	Summer houses	Garaj	Commercial property	Agricultural land	Total
2016-2023	42540	1792	14054	8549	5549	7431	11278	19292	118658

Note. Data are valid for 01.08.2023.

The methodological foundation of this study rests on examining and organizing the works of domestic and international scholars concerning various aspects such as real estate valuation, the current status of the local real estate market, investment analysis focusing on real estate efficiency, fiscal policy, mathematical modeling, and real estate management. Throughout the research, references are drawn from legislative and regulatory documents in the fiscal domain, real estate cadastre, real estate management and appraisal practices, methodological guidelines, online informational resources, and educational frameworks. The study employs general scientific techniques and methodologies, including analysis and synthesis, induction and deduction, grouping, comparison, analogy, scientific abstraction, and statistical methods.

2.1 Mass Appraisal Practice of Real Estate in the Republic of Moldova

Methodological framework for mass appraisal of real estate for taxation purposes in the Republic of Moldova was developed by specialists from the First Cadastre Project after testing the methodology from 2002 to 2004. Experts such as Joseph K. Eckert, one of the founders of the automated mass appraisal system in the United States, as well as specialists from the Netherlands, Sweden, and Canada, had a considerable impact on the advancement of the Moldovan assessment system. According to the established legal framework, each stage of the process consists of a series of technological procedures and specific activities [19, p. 285]. As per specialists in the domain, developing nations utilizing a property taxation system reliant on value encounter two primary hurdles: the absence of an exhaustive list of taxable properties and insufficient transaction price data. Although these challenges could be addressed with ample resources, governments display reluctance to do so, despite the potential benefits stemming from these alterations [4, p. 178]. A complete list of real estate in the Republic of Moldova is guaranteed by the introduction of the Real Estate Register and related legislative acts. The introduction of mass registration programs, as well as ongoing

monitoring of the circulation of real estate objects, provides the state with a good data bank about real estate objects and the rights to them. Regarding transaction data, at the moment government agencies do not have complete information on reflex prices due to the effect of price dumping on the part of transaction participants. There are also a number of other problems that are relevant for the system of mass real estate valuation and have related points to other economic systems of Moldova. For example, illegal buildings and unregistered buildings. The acceptability of property taxes is likely to be undermined if taxpayers perceive that others are avoiding payment because their properties are not registered in the government's accounting system. Informal occupation of land and buildings complicates the maintenance of tax lists and undermines the universality of property taxes [20, p. 24].

2.2 Existing Models of Real Estate Value in Moldova

In accordance with the legal framework of the Republic of Moldova (Government Decision No. 670/2003), in national practice, the primary mass appraisal of real estate for taxation purposes was conducted based on the hedonic model of multiplicative regression established through expert-analytical methods. The models were developed and implemented between 2003 and 2010 [21, p. 114].

Currently, in Moldova, models for the assessment of real estate for taxation purposes are developed, the form of which depends on the assessment methods used. For standard real estate objects (apartments, residential buildings, land), provided there is sufficient sales data, the sales comparison analysis method is utilized.

In general cases, when the assessed object has different components (e.g., land related to the main construction and accessory structures located on it), the assessment model has the structure presented in the Eq. (1).

$$VE=VT+VC, \quad (1)$$

where: VT is the land parcel value; VC is the improvements value (buildings, structures, perennial plantations, etc.).

This model has been transformed into various types to best account for factors affecting the value of properties belonging to different types. Among the variety of assessment models (additive, multiplicative, and hybrid), multiplicative models are most preferred for the assessment of simple objects - apartments, isolated spaces, undeveloped land [19, p. 289]. Such models are based on the sales comparison method.

The assessment model is expressed by Eq. (2):

$$V = VOE \times \prod_{i=1}^n F_i K_i \times S, \quad (2)$$

where: V is the estimated value of a real estate property or a component of the assessed object for multi-component objects, Lei.

VOE is the value per square meter of the standard object, Lei/m².

F_i are variables describing the influence of value factors, typically binary factors, 1/0.

K_i presents a coefficient reflecting the impact on the price of an object of its quality attribute (value factor) F_i.

n is the number of value factors used in the model,

S is the area of the assessed real estate property, m².

The VOE value is considered a base, from which the price of any other object was calculated. In other words, the value of a real estate property (V) was determined by adjusting the value of VOE using the corresponding coefficients (K_i), multiplied by the area (S), describing the

influence of factors intrinsic to this object and distinguishing it from a basic object. Consequently, the VOE parameter contributed significantly to the calculated value of V, while the F factors were mere adjustments, not as significant compared to VOE.

Thus, the used model reflected the general principles of forming the hedonic market price, on which the classical methodology of residential real estate value expertise was based within a comparative approach. The F factors determined the market component in the object's price, and the fundamental component (construction cost, etc.), which was logically an integral part of any object, was included in the VOE parameter. In general, the model allowed, firstly, determining the direction of influence of value factors, and secondly, presenting this influence in numerical terms. The main characteristics of the object that can affect its market price were considered as value factors and are determined through analysis based on expert opinions - analysts/evaluators.

3. Results

Current issues specific to the mass appraisal system in the Republic of Moldova, as well as non-compliant aspects faced to some extent by all countries implementing a property taxation system based on market value, continuously pose challenges in the stages of system development:

- Identification of taxable objects and subjects.
- Quality and transparency of market data.
- Methodological issues in determining the tax base.
- Organizational issues in the infrastructure of the mass appraisal system.

Identifying Taxable Objects and Subjects. Questions related to the identification of the assessment object pertain to unregistered and unauthorized real estate properties, as well as the different classification of taxable real estate objects.

Unregistered and Unauthorized Real Estate Properties. A significant impact on the entire national real estate taxation system in Moldova is represented by real estate properties at the construction level belonging to three groups: unfinished constructions, unregistered real estate properties in the Real Estate Registry, and unauthorized real estate properties. Despite the stipulations outlined in Article 279 of the Tax Code, the taxable entities encompass real estate assets, comprising land along with all structures erected upon it (such as standalone residential buildings, apartments, and other enclosed spaces). This includes real estate properties that have reached a construction completion stage of 50% or more, yet remain unfinished for a period exceeding three years from the commencement of construction activities [22], cadastral authorities do not have information about these objects and cannot ensure their assessment for presentation to tax authorities for taxation purposes [23].

The data collected from various sources undergo statistical analysis and serve as the basis for building mathematical models to estimate the taxable value of real estate. In this context, the quality of data and the level of accuracy of the information sources used become decisive factors in achieving performance indicators for the obtained models.

The quality of evaluation results is determined by the degree of accuracy, logic, and research ability to guide the preliminary stages of data collection and analysis, as well as to manage information efficiently. Aligning the initial "raw" data with the specified quality standards is one of the most important tasks in mass appraisal and constitutes an entire area called pre-processing. The main problems causing the decline in data quality are the lack of a permanent data collection and analysis system and low data transparency. While the lack

of a permanent data collection and analysis system is related to the institutional structure of the real estate cadastre, low data transparency refers more to the fiscal policy of the state.

Methodological issues in Mass Appraisal in the Republic of Moldova. Due to the increased development dynamics in contemporary methodologies, the mass appraisal models currently used to calculate the taxable base in Moldova are oversimplified. This is due to a small number of factors used in determining the property value and the simplistic techniques applied to reflect the complex dependencies in forming the market value. These established models do not adequately reflect the full range of value factors affecting the market value of the property, and as a result, they are often modified. Therefore, property valuation methodologies need to be modified by following the principles of the contribution of various factors and considering the specificity of the real estate market, including the fact that the market value of the assessment object does not represent an arithmetic sum of the component values, such as land and all improvements on it.

Use of Expert-Analytical Method. The expert-analytical method focuses on formalizing expert opinions on the dependence of the market value of land on a combination of influencing factors. This method has gained wide recognition in Moldova at both the national and local levels for individual assessment to determine adjustment coefficients for value factors. However, its application in large cities and small to medium-sized towns with non-standard urban planning characteristics can lead to a significant distortion of results compared to the real cost of certain sections of the urban area. To address this, these cities, as assessment objects, should be divided in advance into territorial zones that are more aligned in terms of cost characteristics, with appropriate subzone allocations based on their functional purpose.

Lack of Regression Elasticity. The value factors are exposed in linear models and lack the elasticity to maneuver for operating factors in nonlinear functions. For example, the surface factor, which is interpreted linearly with value, is damaged by the diminishing returns phenomenon, also, within the interplay of two or more factors, it is notable that their combined effect is substantially less than the mere sum of their individual impacts.

Grouping of Factors into Segments. Another drawback is observed in the use of multipliers for adjusting value, which found a solution through the grouping and clustering of quantitative variables into segments. This has resulted in the formation of a value scale, which misses the fair value between two adjacent quantities.

Effect of diminishing returns. The diminishing returns phenomenon reflects the distortion of mass appraisal results after summing the values of component elements of the assessment object through arithmetic addition without adjustments for the specificity of the complex object. Real estate market value is not equal the sum of the values of its components, evaluated autonomously. This effect is present in the formation of the real estate value, both at the level of the value factors and at the level of the elements - components of the object of evaluation. For instance, the added value of constructions combined with the average value of vacant land does not equal the market value of this property in conditions of a free market.

Neglecting Differentiation in Development Dynamics. Existing evaluation models for categories of complex real estate, which include land and buildings as common value elements, are based on a principle of evenly distributing the loads between these elements for all territorial regions of the country. This approach leads to erroneous effects caused by

the different levels of development in the real estate markets for different regions of the country for land plots and buildings.

4. Discussion

Improving Data Market Quality. Certain issues highlighted earlier are critical in that they impede the functionality of analytical models and algorithms (e.g., missing values and structural breaches). Meanwhile, others (e.g., duplicates, inconsistencies, noise) may not disrupt algorithms but can yield inaccurate analysis outcomes [24, p. 3].

Regardless of the degradation factors present in data, they need to be solved. This is done in two steps: Profiling - studying data to identify problems and developing a problem-solving strategy. Cleaning - involves employing diverse techniques to address identified issues, such as restoring missing data, rectifying anomalies, handling duplicates, inconsistencies, and more.

Optimizing the Methodological Framework for Mass Appraisal of Real Estate. The combination of statistical and expert-analytical methods in the development of a mass appraisal model for real estate is an efficient approach because both methods have their advantages and can complement each other. In the same vein, combined methods rectify mutual shortcomings caused by external and internal factors. Thus, errors resulting from the application of the expert-analytical method in the development of primary models are addressed by applying complex regressions derived from the statistical processing of market data. Simultaneously, errors caused by the lack of data, low data transparency, and the invalidity of existing statistics are effectively rectified by applying a methodology based on empirical practice through expert-analytical approaches.

Implementation of the Log-Linear Model. Following research and examination of market data for residential real estate properties (apartments in apartment buildings, individual houses in urban and rural areas of Chişinău, Bălţi, individual garages, and orchard plots with/without constructions, and ground-floor apartments), the following type of log-linear model was proposed:

$$\ln(V) = Int + \sum_{i=0}^n K_i a_i^x, \quad (3)$$

where: $\ln(V)$ – natural logarithm of the estimated value of the real estate property, Lei.

Int – intercept of the mathematical function. Represents the constant term of the model.

i – indicator of the value factor.

n – number of value factors in the model.

K_i – constant coefficient of the value factor.

a_i^x – value factor (independent variable) to the power of x (for non-linear regression).

The advantages of the optimized model lie in the increased elasticity of non-linear regression between the dependent variable (V) and the value factors. Employing logarithmic transformation of variables in a regression model is a prevalent method to tackle scenarios with a nonlinear association between independent and dependent variables. By substituting the unlogged form with the logarithm of one or more variables, the relationship becomes nonlinear while preserving the linearity of the model.

Logarithmic transformations serve as a practical approach to converting a heavily skewed variable into one that approximates normality. Interestingly, there exists a distribution known as the log-normal distribution, characterized by a logarithm that follows a normal distribution, whereas its original scale is distorted [25, p. 2]. Mostly, real estate prices have a logarithmic (non-linear) relationship with various factors, such as square

footage, number of parking lots/outbuildings, distance from downtown, etc. Logarithmization allows this dependence to be taken into account in an equation, making the model more accurate.

Using logarithms of data makes them less sensitive to outliers and skewed distributions. This reduces the influence of unusual observations and can improve the stability of estimates. Log-linear equation makes the interpretation of model coefficients more intuitive. For example, in the case of a linear model, a one-unit increase in one of the factors can be interpreted as an increase in the percentage or proportion of change in the dependent variable. Many statistical methods, including regression, assume normal distributions of errors. Using logarithms makes the distribution closer to normal, improving the model's fit to established assumptions. Model based on log-linear regression reduces multicollinearity between factors, making the estimation more stable.

Deducing the Effect Diminishing Returns for Value Factors and Components of the Appraisal Object. The introduction of elastic log-linear regressions into the model equation reduces the effect of returns diminishing at the level of measurement units. In order to approach this problem at the level of the components of the complex object, author proposes to separate the function for the value of the developed land related to the constructions on it with the function of the value of the constructions. An example of the application of this equation is provided in the research on the methodological aspects of the mass valuation of real estate, referring specifically to the mass valuation model of residential houses. This innovation will help reduce errors in mass appraisal caused by the diminishing returns effect of component elements of the appraisal object.

Introduction of the Adjustment Coefficient for the Development of the Local Market for Individual Residential Houses in Relation to the Development of the Land Market Segment for Construction. The application of an integrated model of mass assessment of real estate in different regions of the country poses some difficulties in perceiving and adopting the results for market segments local real estate. The proposal to introduce the construction market development coefficient into the model will serve as a catalyst for creating a distortion of the estimated values for areas with differently developed real property markets. Elasticity of the model to variation of land and construction prices in different locations will increase the quality of the results obtained.

Hypothesis Confirmation. In order to confirm the main hypothesis of the given study, such as: The development of the methodological and institutional framework of the massive evaluation process of real estate, as well as the provision of the evaluation system with transparent and truthful market data, will aid in the gradual advancement of the real estate market, as well as to creation of efficient and fair fiscal systems in the Republic of Moldova, the author of the thesis compared the quality indicators of the study of rates for old and new models, elaborated according to the new methodology, proposed in the given paper. The results of the comparison and their analysis are set out in Table 3.

Explanation of the data from the indicator comparison from Table 3:

- Median rate (Me). Compared to the old models, new median is improved (↑) for the examples studied by 56% in the category of apartments and by 73% for urban houses.
- Coefficient of desertion (COD). The dispersion indicator improved (↑) by 70.98% for apartments and by 85.87% for townhouses.

Table 3

Comparison of quality indicators of old and new models (e.g. apartment blocks and townhouses)

Indicator	Recomm ended	Apartments			Urban Dwelling houses		
		old	new	Rate	old	new	Rate
Number of observations		1710			7693		
Median, RM	0.9-1.10	0.41	1.03	↑56.0%	0.24	1.03	↑73.0%
Coefficient of dispersion, COD	5-20%	108.3%	37.3%	↑70.9%	128.32 %	42.45 %	↑85.8%
Price rate derivation, PRD	1.0	1.78	1.19	↑59.0%	1.69	1.28	↑41.0%

• Price Related Difference (PRD) is centered on 1.0, with values above 1.0 suggesting regressive vertical inequity (higher priced properties benefit from lower rates) and values below 1.0 indicating progressive vertical inequity (lower priced properties get lower rates). Although the indicator of price differentiation remains with regressive inequity, optimization (↑) qualifies with 59% for apartments and 41% for townhouses.

5. Conclusion and Recommendations

Currently, the system of massive valuation of immovable property for tax purposes within the Republic of Moldova is not a stable and rigid one. This conclusion is supported by a series of indicators highlighted in various work compartments.

Many current problems in the massive evaluation system facing the Republic of Moldova can be solved in the short term and with accessible resources.

The shortcomings identified in the system of mass valuation of real estate for taxation purposes in Moldova should be urgently addressed by improving the methodological framework used to calculate the cadastral values of properties.

In addition to purely legislative decisions in this area, the optimization of mass evaluation procedures requires the establishment of real estate market indicators. These indicators should serve as a guide for revising cadastral values in the event of significant changes in the real estate market.

Implementing the proposals resulting from the research of this paper will enhance the quality of market data, the methodology used in massive evaluation activities, and the accuracy of the results. The improvement in quality indicators for the models developed according to the proposed methodology demonstrates a potential objective for advancing the field of massive real estate evaluation.

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References

1. Grover, R.; Törhönen, M.P.; Munro-Faure, P.; Anand, A. Property evaluation and taxation for fiscal sustainability and local governance in the Europe and Central Asia region. *Land Tenure Journal* 2015, 2, pp. 7-27.
2. McCluskey, W.J.; Riel, C.D. Franzsen, Land Value Taxation: A Case Study Approach. Lincoln: Lincoln Institute of Land Policy, USA, 2001, pp. 5-6.
3. Bird, R.; Bahl, R. Subnational taxes in developing countries: The way forward. In: Working paper 16. Rotman School of Management, University of Toronto, Canada, 2008, pp. 3-6.
4. Grover, R.; Walacik, M.; Buzu, O.; Gunes, T.; Raskovic, M.; Yildiz, U. Barriers to the use of property taxation in municipal finance. *Journal of Financial Management of Property and Construction* 2019, 2(24), pp. 166-183.
5. Malme, J.H.; Youngman, J.M. The Development of Property Taxation in Economies in Transition: Case Studies from Central and Eastern Europe. The World Bank Institute, Washington, SUA, 2001, pp. 30-34.
6. Bahl, R. Land taxes versus property taxes in developing and transition countries. *Land value taxation: Can it and will it work today?* Netzerincoln, D. ed., Puritan Press, Institute of Land Policy, USA, 1998, pp. 141-171.

7. Zorn, C.K.; Tesche, J.; Cornia, G. Diversifying local government revenue in Bosnia-Herzegovina through an area-based property tax. *Bosnia-Herzegovina: Public Budgeting and Finance* 2000, 20 (4), pp. 78-83
8. Muravschi, A. Sel'skoe hozjajstvo dlja razvitija. *Akademios* 2007, 4, 1(8), pp. 15-20.
9. Buzu, O.; Matcov, A. Evaluarea bunurilor imobiliare: teorie și practică. Tipogr. Centrală, Chișinău, Republica Moldov, 2003, p. 258.
10. Gorobievski, S.; Dorofeeva, L. Econometric modeling, evaluation and forecasting of the rural workforce situation in the Republic of Moldova. In: *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 2019, 19(12), pp. 175-184.
11. Albu, S.; Albu I. Applicability of Databases in the Real Estate Valuation Process in the Conditions of the Emerging Economy of the Republic of Moldova. *Open Journal of Applied Science* 2021, 11(6), pp. 623-632.
12. Albu, S.; Albu, I.; Țurcanu, N. Analiza factorială a valorii de piață a imobilului rezidențial. UTM, Chișinău, Republica Moldova, 2007, pp. 17-29.
13. Botnarenco, I.; Bratco, D. Valoarea terenurilor – oglinda economiei. In: *Proceedings of Conferințe "Rolul agriculturii în acordarea serviciilor ecosistemice și sociale"*, Bălți, Moldova, 2014.
14. Sanduța, T. Abordări moderne privind drepturile patrimoniale. In: *Proceedings of Conferințe "Aplicabilitatea metodelor de evaluare a terenurilor cu plantații perene în Republica Moldova"*, UTM, Chisinau, 2022
15. Nicolov, I.; Sanduța, T. Analiza metodelor de estimare a valorii terenurilor aferente construcțiilor. In: *Proceedings of conferințe "Tehnic-Științifică a Colaboratorilor, Doctoranzilor și Studenților"*, UTM, Chișinău, 2014, 2.
16. Buzu, O. Prioritățile de evaluare a bunurilor imobile în țările CSI. *Facultatea Construcții, Geodezie și Cadastru*, 2011, 1, pp. 401-406.
17. Legea nr. LP240/280, privind ratificarea Acordului de finanțare dintre Republica Moldova și Asociația Internațională pentru Dezvoltare în vederea realizării Proiectului de înregistrare și evaluare funciară, Chișinău: Parlamantul RM, 2018.
18. Buzu, O. Ways to Improve Real Estate Assessment for Taxation Purposes in the Republic of Moldova. *Studia Universitatis: Moldavia (Seria Științe Sociale)* 2010, 2(32), pp. 284-289.
19. Buzu, O.; Guțu D.; Guțu V. Problemele actuale în domeniul studierii cadastrului și evaluării bunurilor imobile. *Studia Universitatis: Moldavia (Seria Științe Sociale)* 2010, pp. 106-127.
20. De Cesare, C.M. Improving the Performance of the Property Tax in Latin America. *Lincoln Institute of Land Policy*, Cambridge, USA, 2012, pp. 23-27.
21. Legea nr. 1163, Codul Fiscal, Chișinău: Republicat: Monitorul Oficial al R. Moldova, ediție specială din 08.02.2007, 1997.
22. Paladi, A. Some Critical Aspects in the Assessment of Certain Real Estate Groups for Taxation in the Republic of Moldova. In: *Proceedings of Conferințe "Stroitelno predpriemachestvo i nedvizhima sobstvenost". Sbornik s dokladi ot 34-ta mezhdunarodna nauchno-prakticheska konferencija*. Varna, 2019, pp. 220-230.
23. Anselin, L. Lagrange multiplier test diagnostics for spatial dependence and spatial heterogeneity. *Geographical Analysis* 1988, 20(1), pp. 1-17.
24. Benoit, K. Linear Regression Models with Logarithmic Transformations. Available online: <https://kenbenoit.net/assets/courses/ME104/logmodels2.pdf> (accessed on 25 April 2024).
25. Bajura, T.; Popescu, S. Piața funciară autohtonă: starea actuală și perspectivele dezvoltării. *Economie și sociologie* 2010, 3, pp. 37-42.

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