COMPARATIVE APPROACH APPLICATION IN VALUE ASSESSMENT OF LAND AREAS IN LITHUANIA

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Abstract

Real estate industry is of great importance in development of economy of a country. Real estate value determination, including land areas, is one of the problematic fields. Correct valuation of real estate value is relevant in the financial services sector, insurance and lease companies as well as construction sector, agencies that sell properties, institutions that manage the Real Estate Register, it is also important for citizens who purchase and sell their real estate. Current valuation methods solely specifies requirements for application of the comparative approach – to evaluate time, place and other conditions expressing differences between the valued property and analogous or similar properties. This definition does not reflect the totality of criteria to be evaluated when estimating the value of the property. It should be noted that one of the most important factors of value substantiation is selection of totality of criteria applied in object value calculation, evaluation of the criteria (sub criteria) and interpretation of obtained results. In absence of exhaustive, reliable and continuous research identifying the criteria and importance thereof in calculation of the value, appraiser refer to expert valuation that is acceptable and applicable in calculation of real estate value, but has both advantages and disadvantages. The research carried out by the authors discloses that current data collected by the State Enterprise Centre of Registers are not sufficient and suitable for formation of methodology based on a data base. Lack of data about market transactions, quality and exhaustiveness thereof prevents reliable application of methods based on analysis of factual data. For this reason expert valuation remains as priority method for calculation of real estate value using the comparative approach. Therefore application of continuous research identifying criteria influencing the market value of real estate is recommended in the future, as well as preparation of valuation methodology for real estate valuation in consideration of analysis of data located at data bases of the Real Estate Register.

KEY WORDS: real estate, value of land areas, market value, assessment methodology, comparative approach.

JEL: L85, C51

Introduction

The global financial crisis of 2008 - 2009 and the confusion in markets stimulated a strong interest in the impact of property valuation on financial markets as well as the large regulation of this area.

Regardless of whether it is performed for tax, loan or any other purpose, property valuation is a complex process, which requires not only to identify and evaluate the key market factors and criteria but also to determine how they affect the value of the property at the time of its valuation. It is a process, which requires the appraiser's knowledge not only in the valuation methods, the real estate market analysis, but also in legislation governing the property valuation (Walacik, Grover, Adamuscin, 2013).

The process of valuation can be described as a thoroughly considered estimation of value based on the appraiser's experience and opinion in identifying and evaluating specific criteria, which influence the value of the property (Yomralioglu, 2003). Possible differences in value, determined applying different valuation methods as well as different skills, knowledge and appraiser's experience, influence the regulation of the valuation process. This regulation is also indirectly influenced by appraisers themselves (Walacik, Grover, Adamuscin, 2013).

In many countries, valuation of real estate has been and still is based on the intuition and accumulated experience of real estate appraisers. Nowadays, when more and more attention is paid to the securitization of real estate in the

markets, simultaneously more effort is put to ensure the most logical, quantifiable and accurate selection of the real estate valuation technique (Yomralioglu, 2003). One of the greatest issues in the contemporary practice of valuation is the determination of correction criteria and their justification applying the method of comparative value. Such countries as USA apply the value estimation method based on the data analysis of market transactions, which may constitute an alternative method for expert valuation. However, foreign methods are not suitable for Lithuanian market. According to Raginis (2015), the Slovenian experience in mass valuation and dissemination of data on market transactions presented in the international conference held in Vilnius revealed a much more transparent application (in some cases, free of charge) of the database of market transactions.

The analysis of scientific literature leads to the lack of information on both the determination of criteria themselves and the impact of these criteria on the valuation of real estate in Lithuania. This situation leads to the issue of determining the methods required to justify the application of corrections in assessing the value of land plots by a comparative approach. The determination and justification of these methods must ensure the impartial and accurate valuation of the property value.

Authors studying valuation of real estate, namely A. Tumelionis (2013); S. Raslanas; Zavadskas; Kaklauskas; Zabulėnas (2010); A. Aleknavičius (2008); R. Raslanas, J. Šliogerienė (2012), examine individual criteria affecting real estate and methods of identification of effects of such criteria, including both expert and mathematical, however, no clearly identified and distinguished criteria as well as

their influences are found in the literature dealing with the valuation of real estate in Lithuania. As a result, the appraiser has to take into account many unknowns using the comparative approach (Schulz, 2003). Most commonly, these values of corrections are determined through expert surveys. In this sense, the traditional technique of comparative approach is not very accurate and the results depend on the appraiser's talent to find probable and reliable correction criteria (Schulz, 2003).

Real estate market value assessment is an important segment also to a number of investment projects focused on the market economy. The need to create approaches for property valuation and to include them in legislation clearly defining valuation models and parameters is a mandatory factor for the valuation of real estate to be reasonable, unique and acceptable to all participants of the market. This approach applying different methods of data processing and corrections could reduce uncertainties, in determinacies, manipulation of documentary evidence and could enhance the transparency of the valuation process (V. Zujo, D. Car - Pusic, V. Zileska - Pancovska, 2014).

The present article aims at determining, through data stored in the database of the Real Estate Register operating in Lithuania, criteria influencing the value of land plots as a type of real estate, as well as at revealing the impact of these criteria on the value estimation.

Relevancy of the research. The development of application techniques of the comparative approach through access to the database of real estate transactions.

Research tasks:

1. To examine application techniques of the comparative approach.
2. To present the existing methodology of analysis of criteria influencing the property value.
3. To conduct the differential analysis of the dependence of value of land plots on the area.

Application techniques of the comparative approach

Analyzing Lithuanian real estate valuation market, it should be noted that the county applies three valuation methods also governed by the law. This include the income approach, costs and comparative approach.

The most popular and widely used method to assess land plots market value is the comparative approach. (Yomralioglu, 2003). The comparative approach is the most commonly applied and well-known method of valuation. Applying this approach, the value of assessed property is determined referring to sales prices of similar objects (Walacik, Grover, Adamuscin, 2013). In the comparative approach, the sales prices of very similar and recently sold estate are used to estimate the market value of the assessed property. In order to apply this method of assessment, the appraiser must have several comparable objects and adjust prices of comparable objects taking into account their differences from the assessed object (Schulz, 2003). The appraisor shall have sufficient knowledge in prices of comparable objects and factors affecting the property (Trojanek, 2010). This method requires a sufficient amount of transaction data, however, assessors are often unable to collect sufficient information about

comparable objects due to commercial secrecy, insufficient amount of data, the system of taxation of real estate and the correspondent dissemination of information (Yomralioglu, 2003). One of the main drawbacks of the comparative approach is its limitations in the market, which fails to provide adequate information on transactions (Raslanas; Zavadskas; Kaklauskas; Zabulėnas, 2010). In addition, it must be noted that assessors face not only with the lack of data but also with the quality of reported data. The existing database provides only the defined number of criteria identifying the real estate and its individual features.

In the comparative approach, the sales prices of very similar and recently sold estate are used to estimate the market value of the assessed property. In order to apply this valuation method, the appraiser must have several comparable objects and adjust prices of comparable objects (Schulz, 2003). While assessing land plots through comparative approach, the assessor selects several similar recently sold objects; since there are no two identical objects in the market, the appraiser has to adjust the price of each selected object taking into account differences between comparable objects and the assessed property (Walacik, Grover, Adamuscin, 2013). All of these criteria must be clearly identified and specified in the valuation report.

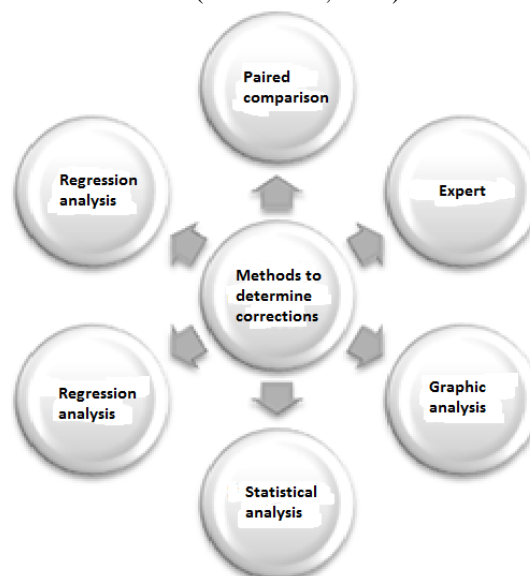In practice, corrections of criteria differences may be determined as follows (Tumelionis, 2013):

Fig. 1. Methods of determination of corrections

However, the attention should be drawn to the fact that all techniques, except for the expert one, require not only a sufficient amount of actual data but also the identification of criteria, which have affected the transaction price. The amount of data displayed in the database does not suffice to estimate the value taking into account the fact that the amount referred to in the literature is considerably larger. There is no sufficient analysis revealing the impact of these criteria on the property value.

In addition, it should be noted that the legal acts, namely the Law of the Republic of Lithuania on Amendment of the Law on Bases of Property and Business Valuation (2011) and the Methodology and Assessment of Property and Business (2012), require, however, provides no methods, formulas, calculation sequences, patterns or

samples of calculation of corrections; the calculation of corrections is not elaborated. Neither the European Standards of Assessment (2016) nor the International Standards of Property Assessment (2013) provide the same.

The existing analysis methodology of criteria influencing property value

Applying the comparative approach and adjusting the sale prices of comparable objects, corrections of the compared object are made focusing on the assessed object, therefore the market value of the assessed object is estimated adding the sale price of the compared object and the value of adjustments. If the value element of the compared object is better than of the assessed one, corrections are made downward, and vice versa, i. e. if the characteristics of the assessed object are better, the price of the compared object is raised (Raslanas, Šliogerienė, 2012). In other words, the more differences the compared object has, the more corrections are to be made. The amount of corrections may determine the accuracy in the value of the assessed object as the less corrections the comparable objects need, the more similar they are to the assessed object and the more accurate the established value will be (A. Aleknavičius, 2008).

According to Yomralioglu (2003), land valuation depends on physical and economic factors affecting the assessed property. These factors and their number must be taken into account performing the valuation of land plots. Some of these factors are characteristic to specific land plots, others include external or environmental factors. These factors can be objectively determined, however, there is always a certain degree of subjectivity, which is difficult to substantiate in the process of valuation (Yomralioglu, 2003). As Cupal (2014) points out, all variable factors, except for the price, include technical characteristics, location, conditions for development, spaces for the disabled, the entirety of social and legal restrictions, etc. The appraiser should have competence and opportunities for quantifiable evaluation of these variables. Only then the property can be compared with each other.

A considerable number of factors influencing the value of a land plot may be distinguished (Aleknavičius, 2008):

Table 1. Factors affecting the value

Factor description
Configuration of the land plot and its convenience in respect of agricultural works;
Land use, management and disposal restrictions;
Land easements;
Territorial distribution of the land plot in respect of the acquisition of production necessary for farming as well as the realization points and social, cultural and public service facilities necessary for the landowner;
Engineering infrastructure of the land plot, fittings and improvements, landowner's buildings and structures on the land plot;
Availability to use the land plot for other activities (for instance, construction or recreation) taking into account the fact that the change of the main targeted land

Factor description
utilization purpose is associated with the compensation of respective losses;
Productivity of agricultural land or relative fertility;
Territorial distribution of land in respect of cities and other objects corresponding the nature of its use;
Influence of a residential house or a farm building situated on the land plot;
Networks of engineering infrastructure or possibility to install them;
Configuration of the land plot taking into account the land unsuitable for construction, possibilities to form a larger piece of land (by connecting the whole or a part of an adjacent plot) or to split it if necessary, i. e. to form a separate land plot for sale or lease;
Possibility to use a piece of land for recreation;
Land use, management and disposal restrictions;

The main parameters of assessed objects and their effect may be divided into two main groups: commercial and parametric. Commercial factors include transferable rights, financial terms and sale conditions, commercial attractiveness. Parametric factors include the object's location, area, the ratio of the built-up and total land area as well as other parameters (Novickis, 2015).

In the process of valuation, the appraiser must refer to the market and economic logics, criteria based on the observation of market and economic conditions, as well as study results (methodology). However, it should be noted that there are neither specialized studies assessing the impact of these and other unidentified factors on the property value, nor opportunities to evaluate the significance of these criteria using the existing database of the Real Estate Register. As academics analyzing the real estate valuation issues note, a simple polynomial correlation-regression analysis can be applied to determine the factors affecting the value of land plots (Raslanas; Zavadskas; Kaklauskas; Zabulenas, 2010).

Statistical mathematical analysis may be applied to estimate the object value, however, the amount of data must be large enough in order to apply a specific method of determination of statistical data (Walacik, Grover, Adamuscin, 2013).

The conclusion can be drawn that statistical methods based on the analysis of transaction data are not common in the Lithuanian practice, therefore it is natural that the appraiser's experience, which determines valuation quality, plays a significant role applying the comparative approach (Raslanas; Zavadskas; Kaklauskas; Zabulenas, 2010). In other words, most commonly these criteria depend on the appraiser's experience and the expert appraiser's decision (Schulz, 2003).

This is why, in their practice Lithuanian appraisers apply expert valuation methods, with the help of which experts determine assessment coefficients, rates and standards (comparative indicators) referring to the valuation experience and analysis of individual items of property. This method is usually applied in cases where there are insufficient market data for the comparative approach or income method to apply (Robert J. Glaudemans, Richard R. Almy, 1997).

The inclusion of methods of analysis of statistical transaction data in the process of valuation would allow to deal with the main issue associated with the subjectivity of expert opinion in the process of valuation. Expert, statistical methods, based on the analysis of transaction data, as well as combinations of these methods would allow to compare values applying different methods of processing and evaluation of data and factors. The entirety of approaches and techniques may improve the quality of valuation reports (Cupal, 2014).

In order to avoid valuation discrepancies, following the experience of USA and other foreign states Raslanas (2005) suggests in the Lithuanian methodology of property valuation to establish the required number of comparable objects, which should be taken into account by appraisers, as well as limits of discrepancies between values of the valued object and comparable objects. In her article, Galinienė (2001) states that all participants of the real estate market (buyers, sellers and financial intermediaries, including banks) should also be constantly and adequately informed of peculiarities and change tendencies of the real estate market. However, it should be noted that, according to the author, such information is still lacking.

Differential analysis of the dependence of value of land plots on the area

The research involved bank data on real estate transactions from the State Enterprise Centre of Registers, including land transactions in the Republic of Lithuania over the period from 2008 to 2016.

Before performing the analysis of the data from the State Enterprise Centre of Registers, the impact of the area on the estimation of value common in the practice of valuation was also taken into account. The models used by appraisers in their practice and the analysis of available data revealed that after conducting the expert research, appraisers devote from 21,74 % to 25,33% of importance to the area of land plot, depending on the intended purpose (Jegelavičiūtė, 2016).

Our analysis involved purchase-sale transaction data of residential, other industrial/warehousing and commercial land. Analyzing the mass valuation in Lithuania, Almy (2015) said that various methods of mass valuation may be applied. According to the author, the Centre of Registers chose to develop mixed statistical models with sufficient sales, however, the author also points out that the appraiser's decision complements the data analysis, where there is a lack of direct evidence in the market. In order to identify exact application possibilities of analytical methods for the valuation of land value, it is necessary to perform the statistical analysis.

In order to determine the impact of analytical valuation approach on the assessment of land value, the data from the State Enterprise Centre of Registers on the sale of land plots over the period from 2008 - to 2016 will be employed. First of all, exclusions are analyzed and eliminated (Multivariate Approach). The analysis involved cooks distance, which measures the effect of deleting a given observation. In total, the analysis eliminated 21 observations. For instance, in 2008, in Elektrėnai region, an industrial land plot exceeding 5 hectares was acquired, as well as the commercial land plot of 16 hectares was

purchased in Klaipėda region in 2011, etc. These observations were eliminated since cooks distance coefficient exceeded the existing average of values four times.
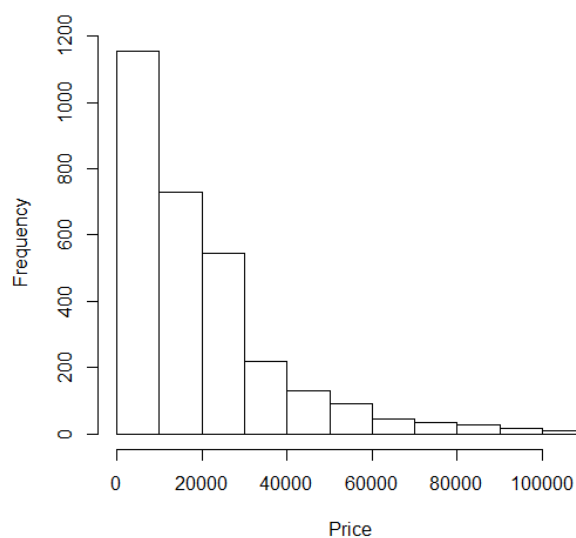

Fig. 2. Distribution of prices for residential transactions in Kaunas region in 2008

The chart (see fig. 2) reveals that the dependence of the price on the purchased land area is decreasing, therefore the composed regression model may also predict a negative price, which would be biased. It also shows that the model is more in line with the exponential distribution than normal. In order to solve this issue, the data are transformed through logarithming.

In the first stage, the regression analysis is applied only on the land area and price.

Table 2. Summary of the regression analysis of the land plot and the price

Coefficients	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	4.6	0.02	273.25	<2e-16 ***
Land area	0.62	0.02	42.09	<2e-16 ***

The composed regression model revealed that the land area is statistically significant in determining the land price (P value< 0.05). However, R-squared received only 0.16, which means that the land area explains only 16% of the land price movement on average (see table 2).

Table 3. Land distribution by criteria

Criteria	Category	Value
Cities category	Kaunas	1
	Vilnius	1
	Klaipėda	1
	Other	2
Type	Municipality	1
	County	2

Use	Residential	1
	Commercial	2
	Industrial	3
Year	2008-2016	

In the next stage, the analysis was repeated employing more variables. The data were differentiated according to the intended purpose of the purchased land, the locality was divided into big cities and small towns, cities and towns or district territories (see Table 3).

Table 4. Dependence of the land price on several variables

Coefficients	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	-27.776	8.052	-0.87	0.000564 ***
Land size	0.967	0.016	56.7	< 2e-16 ***
Use	0.045	0.029	-2.7	0.0069 *
Type	-0.208	0.014	-21.2	< 2e-16 ***
Cities category	-0.431	0.014	-34.2	< 2e-16 ***
Year	0.017	0.004	1.65	3e-05 **

$$y = 10^{(-27.776 + \log_{10} x_1 * 0.967 + x_2 *(-0.045) + x_3 *(-0.208) + x_4 *(-0.431) + x_5 * 0.017)} \qquad (1)$$

where y – land price, x_1 – purchased area, x_2 –intended purpose, x_3 - type, x_4 –city category and x_5 – year.

The repeated regression analysis revealed that all variables are statistically significant (see table 4). Multicollinearity diagnosis demonstrated that coefficients of all variables are close to unit, therefore there is not multicollinearity problem in the composed regression model (see table. 5).

Table 5. Multicollinearity analysis of independent variables

Land size	Type	Cities category	Purpose	Year
1.19	1.2	1.19	1.15	1.07

The prediction test with the composed regression model revealed that the prediction errors vary from 0.02% to 19118%. Such a result is determined by the fact that the composed module explains only 34.27% of variation (R-squared = 0.3427).

Conclusions

The models used by appraisers in their practice and the analysis of available data revealed that after conducting the expert research, appraisers devote from 21,74 % to 25,33% of importance to the area of land plot, depending on the intended purpose. (Jegelavičiūtė, 2016). The conducted research of data registered in the database of the State Enterprise Centre of Registers on the sale of land plots over the period from 2008 to 2016 revealed that the land area affects only 16% of changes in the price dependence. After the inclusion of additional variables in the model, 34, 27% of the price change was explained. Therefore, it can be concluded that there is a number of variables, which are not captured in the existing system, however, have a significant impact on transaction prices.

The composed analytical equation demonstrates that land prices may be analytically assessed, however, it requires large quantities of data of different categories, which were minimally applied in the present study. In the future, it is advisable to expand the land value valuation methodology through analytical approach. This requires to identify appropriate criteria and broaden analytical module in order to adequately determine the land value. Before the formation of an appropriate module, it is advisable to assess the land value applying the principle of expert valuation as the analytical approach requires valuation corrections, which are indefinite.

In order to create the adequate approach for analytical valuation, it is necessary to analyze the approaches conducted abroad, to repeat a similar research in Lithuania and on the basis of research results to compose the land valuation methodology of analytical approach. This process must be conducted taking into account the largest possible diversity of land plots and the appropriate criteria to explain transactions. It is also important to emphasize that the available data on the land area were comprehensive without distinguishing the land price itself. The land price may be determined not only by its area but also terrain, communication places, etc. One of the possible analytical valuation methods were performed in America. Ames, Iowa analyzed Boston housing data and applied an advanced regression model to predict housing prices. The model consisted of 80 different variables, of which: 23 nominal, 23 ordinal, 14 discrete, and 20 continuous. The variables varied from price, building class to location from public transport, house heights, pluming, etc. (http://ww2.amstat.org/publications/jse/v19n3/decock.pdf).

It is advisable to perform further broader studies, which would allow to assess the factors affecting the land value and to reduce land valuation corrections through a more regular analytical expression.

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