VGTU LEIDYKLA TECHNIKA

Regular Paper

LAND VALUE TAX IN THE CONTEXT OF SUSTAINABLE URBAN DEVELOPMENT AND ASSESSMENT. PART II – ANALYSIS OF LAND VALUATION TECHNIQUES: THE CASE OF VILNIUS

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Received 14 January 2009; accepted 23 December 2009

ABSTRACT. Part Two of this article deals with problems related to land valuation. For that purpose, a site of 6.89 ares located in Švitrigailos Street XX, Vilnius, was selected as the research object and appraised using three approaches: the sales comparison approach, the MAMVA method and the mass valuation approach. Peculiarities of these methods in land valuation were reviewed and the recommendations were provided for land valuation for taxation purposes applicable in a new Model for Lithuanian Real Property Taxation System.

KEYWORDS: Land market value; Sales comparison approach; Multiple attribute market value assessment method MAMVA

1. INTRODUCTION

Part One of this article (Raslanas et al., 2010) stressed the importance to follow the principle of just taxation, which is understood as calculation of the exact and valid tax value. Chapman et al. (2009) stated that land value taxation has numerous potential advantages compared to conventional property taxes on capital and land. However, this statement is based on the idea that land values are assessed without error.

The majority of European countries have systems of mass valuation of land for taxation purposes in place. Mass valuation of real property is a systematic valuation of real property items performed on a specific date using standard procedures and statistical analysis, while individual valuation determines the value of an individual property item. Mass valuation models are commonly based on the sales comparison method and the ordinary least squares (OLS) linear regression is the

International Journal of Strategic Property Management
ISSN 1648-715X print / ISSN 1648-9179 online
http://www.ijspm.vgtu.lt
DOI: 10.3846/ijspm.2010.13

traditional method used to build models in this approach (Kontrimas and Verikas, 2006, 2007, 2009).

Although the sales comparison approach is the most common and preferred method, the results obtained from mass valuation models are influenced by the number of market transactions used in the analysis and by the accuracy of the data, which are sales prices. Among the most important drawbacks of the sales comparison approach are its limitations in the markets that fail to provide sufficient data about transactions.

Aragonés-Beltrán et al. (2008) proposed the application of the Analytic Network Process (ANP) based on the Multiple Criteria Decision Analysis (MCDA) in property valuation. It attempts to deal with some of the drawbacks found in classical property valuation methods and to broaden the scope of current approaches. Traditional land valuation methods are more liable to be restricted with human elements. Land valuation using C5.0 with the function to build Boosting decision tree is a more scientific and appropriate land valuation method (Xue et al., 2008)

One of the prevailing real estate market behaviour theories that help to assess the market value of property is the theory of value disintegration, which states that the market value of property can be calculated by disintegration of such property into a set of attributes. The disintegration methods are, however, more successful in mass analyses rather than in valuation of individual property. Kettani and Khelifi (2001) presented the decision support programme PariTOP, which employed mathematical programming in assessment of the market value of large amount of residential property in Quebec. The PariTOP technique is based on the direct comparison method, where the market value of property is explained through its comparisons with other successfully sold properties.

2. ESTIMATION OF THE MARKET VALUE FOR LAND SITE

In the sales comparison approach, the market value is estimated on the basis of the comparison of the subject and similar properties, which have been sold recently or are listed for sale, or agreements for sale of such property are in the process of execution. This method's main assumption is that the market value of property is directly related to prices of comparable and competitive properties. The more comparable sales transactions are available, the better the final analysis. The value differences of two properties are calculated by multiplying the differences of the valuated features with fractional correction coefficients for such features. Whereas in valuation of urban land sites the most important correction coefficients are for front, width and depth of each existing parcel (Castillo et al., 2007).

The specific feature of the sales comparison approach is the ease of its use; thus it is the most popular among appraisers and, in most cases, returns the most reliable real estate value, especially if the number of equivalent objects sold in the market is high. However, appraisers commonly use only small amount of data related to sales prices of comparable properties in their valuations and compensate that lack with their knowledge and experience. Comparable items must be as closely matched to the factors affecting the value of the appraised property as possible. All cases with unusual or personal circumstances related to sales must be eliminated. The objects can only be compared when the corrections of their relatively negligible differences do not exceed 35 percent. The corrections should not be based on subjective assessment of differences between the objects (Raslanas, 2005; Raslanas and Tupėnaitė, 2005).

Application of the sales comparison approach must necessarily consider all factors

affecting the value, including the neighbourhood factor. The effect of such factors can be determined through a simple polynomial correlation-regression analysis, which, however, is not common in practice. Naturally, appraiser's experience, which determines the quality of valuation, is important in the sales comparison approach. In his study, Isakson (2002) analysed different interpretations of the sales comparison approach used by scientists and practicing appraisers and finally came up with two models, which revealed that scientists usually use assumptions and the results of correlation-regression analysis to calculate the values, while appraisers typically base their decisions on their experience. The author's conclusions may benefit both parties by matching the practice of appraisers and the mathematical analysis technique of scientists.

Valuation of built sites includes a new factor – a building. The presence of a building means that it must be considered in land valuation. There are two opposite opinions whether buildings may affect the land value. Some experts believe that buildings should not be considered in land valuation. In such case, the value of land in a built site is determined as if it is free of any buildings. However, a common belief claims that values of a built site and an unbuilt site cannot be compared. There are cases when the actual buildings differ from the permissible extent of construction and this fact must necessarily affect the value; besides, land valuation as if the site is unbuilt is fair only in exceptional cases. The land value in sites with old buildings is usually lower than that of similar sites without buildings. Lin and Jhen (2009) applied the linear regression model for real property through separation of the values of land and a building. They demonstrated that the ratio of land value to total property price varies across property types and age of property.

On the basis of the methods described in this article, the valuation of private land site is our research. Three properties comparable to the appraised property were selected. The data about real and completed transactions were obtained from the state enterprise "Registrų Centras" (the Centre of Registers). Two properties are in the same Naujamiestis Neighbourhood (nearby) and the third property is in a nearby neighbourhood.

The appraised property and the comparable properties have differences in quality, quantity and market conditions. The description of the valuated item and the comparable properties is presented further on in this paper. The purpose of the present model and database is to determine the highest and the best use of a property (the highest and the best use is the fundamental concept of the value which implies the maximum profitability by best utilization of an asset). In order to demonstrate the application of the above module and the database, the sites are considered below as an example. The module and the database assume direct and proportional dependence of priority (highest and best use) of the versions in question on a system of criteria adequately describing the alternatives and on values and significances of the criteria. Experts determine the system of criteria and calculate the values and initial significances of criteria. Stakeholders can correct this information by taking into consideration their goals and existing capabilities. Hence, the assessment results of alternatives fully reflect the initial data jointly submitted by experts and stakeholders.

3. DESCRIPTION OF THE VALUATED LAND SITE

The land site valuated in this article is located in Naujamiestis Neighbourhood (Švitrigailos Street XX, Vilnius; Figure 1). Naujamiestis Neighbourhood is in the central part

of Vilnius to the west of Senamiestis Neighbourhood, on the left bank of the river Neris. It is a unique neighbourhood both by the number of operating companies, by the size of its territory and by the concentration of companies. The neighbourhood covers an area of 4.8 km^2 or 1.2 percent of the entire territory of Vilnius. The number of companies operating in the neighbourhood is the highest in the city of Vilnius: 3,626 companies or 22.4 percent of all companies operating in Vilnius. The density of companies is also the highest in the city and makes up 755.4 companies per 1 km^2. In addition to the high concentration of companies, the neighbourhood is also highly multifunctional because one type of activities does not dominate as in other neighbourhoods.

The site is trapezium-shaped, covers an area of 6.89 ares and is on a level relief (Figure 2).

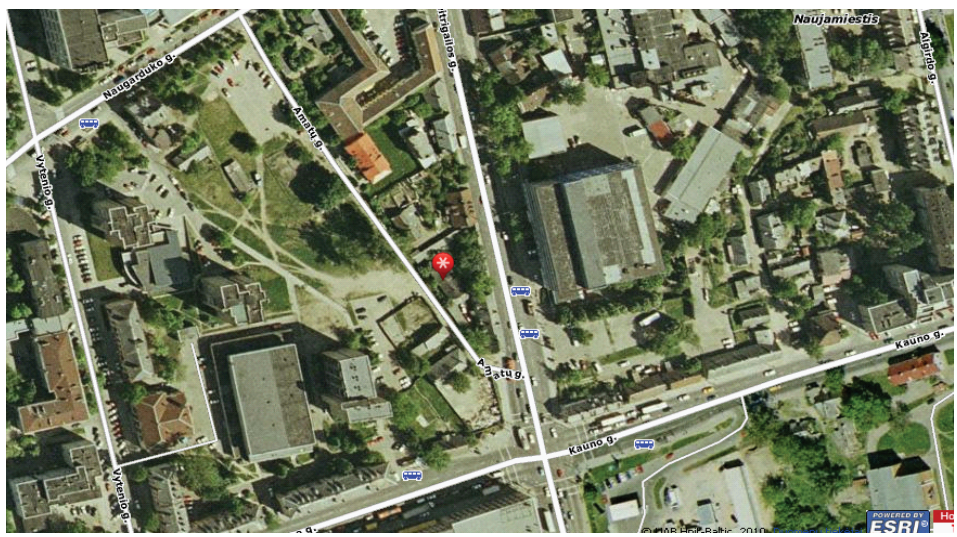

Figure 1. Map of the territory

Figure 2. Appraised property (site)

The following networks are available in the site: water supply, rainwater drainage, sewerage, gas and telecommunications. The site is in the territory of abandoned houses and ends at Švitrigailos Street (4-lane asphalted street with pavements) on one side and at Amatų Street (unsurfaced) on another. The buildings of Vilnius sock and hosiery production company "*Sparta*" are across Švitrigailos Street. There are the shopping centre "NORFA", the Faculty of Electronics (VGTU) and Naugardukas Secondary School at a distance of 200 metres from the site.

The appraised site is also close to the crossroads of Kauno Street and Švitrigailos Street and the buildings of the former factory "Elfa". The traffic in Kauno and Švitrigailos streets is heavy. Therefore, the air pollution by exhaust gases of vehicles and the noise levels are high in the site.

The distance to the centre of Vilnius (Gedimino Avenue) is about 2 km; also about 2 km to Vilnius International Airport and about 1 km to the bus and railway stations. The access to the appraised site is good: fast and simple routes to the centre both by public and private transport. Specific features of the environment include domination of old construction industrial buildings, which are currently partly converted, and apartment buildings of old construction. The site is covered in debris and overgrown with trees and shrubs. The purpose of the site is "other purposes" (for construction and use of private houses/structures).

The dominating features of the territory around the appraised site, which are specified in the table of regulations of the main drawing of the General Plan of the City of Vilnius for 2015, are as follows: mixed territories of the key urban centres with exclusive requirements applicable to architecture of buildings and public areas. Residential, commercial and public activities dominate.

Possible main purposes and ways of land use:

- Conservation purposes (in territories of protected objects);
- Other purposes:
  - residential territories;
  - public territories;
  - territories for commercial buildings and structures;
  - territories for engineering infrastructure;
  - recreational territories;
  - shared territories.

Building regulations (applicable to new construction works) are as follows: maximum building intensity UI in sites $u_{max} \leq 3.0$, maximum building height h_{max} (not applicable to technological equipment) up to 35 m (high-rise buildings are possible in case of a special plan of high-rise buildings). Thus the provisions of the general plan are the factor that raises the value of the site.

4. REVIEW OF THE LAND MARKET IN THE CITY OF VILNIUS

The land market is still in the process of formation and rather chaotic in Lithuania. The situation is determined by various factors, among which the key factors are the incomplete process of land return, insufficiently defined land planning procedures and a high variation of housing prices. Encumbered land return limits the supply in the land market thus contributing to the trends of increasing land prices. In 2007, the land market in Vilnius was determined by small supply of attractive sites. However, in case of sites offered for sale together with a detailed plan or a building permit, the real estate developers, after assessment of their expenditures and the return on investment, would shy away from buying due to excessive prices.

In 2007, the supply of sites for multi-storey construction was increasing and their prices not only stopped rising but also dropped. The situation was determined by the fact that prices of multi-storey construction sites had reached the ceiling, construction costs had increased and the margin profits of real estate development had decreased. Therefore, companies that did not have real estate development as their main activity but rather procured the sites for speculation purposes failed to develop the sites and made a decision to sell them instead of constructing something in them. Foreign investors also lost hope to make fast and speculative profit from land thus they refrained from blind procurement of land. The resulting higher supply was the cause of falling land prices.

Residential and commercial sites in prestigious districts of Vilnius – the Centre, the Old Town, Užupis, Antakalnis, Naujamiestis and Žvėrynas – were the most expensive. The land in the territories with the highest allowed building intensity foreseen in the General Plan of Vilnius was traded at the highest prices. The trends of urban development and investments into a specific location also made a significant impact on the land price. The average price of residential sites in the centre, on the left bank of the Neris, varied between 1,000,000 LTL/a and 1,500,000 LTL/a ("a" stands for "are"), while on the right bank of the Neris varied between 215,000 LTL/a and 450,000 LTL/a. The prices of residential sites in the Old Town varied between 200,000 LTL/a and 300,000 LTL/a, in Užupis between 200,000 LTL/a and 350,000 LTL/a, in Naujamiestis between 150,000 LTL/a and 240,000 LTL/a, and in Žvėrynas between 200,000 LTL/a and 300,000 LTL/a. The sites in Antakalnis were cheaper and their average prices varied between 100,000 LTL/a and 200,000 LTL/a. The average prices of residential sites in Naujininkai, Žirmūnai and Rasos varied between 70,000 LTL/a and 200,000 LTL/a, while in Lazdynai, Karoliniškės, Justiniškės, Pašilaičiai, Baltupiai, Jeruzalė and Santariškės between 70,000 LTL/a and 130,000 LTL/a. The sites in the suburbs of Vilnius and in the commuter settlements were cheaper. The average price of residential land varied between 10,000 LTL/a and 25,000 LTL/a, while the average price of agricultural land varied between 1,000 LTL/a and 3,000 LTL/a.

The following factors determined the demand for the appraised site and its market value:

- the purpose of the site, which is "other purposes" (for construction and use of private buildings/structures);
- provisions of the General Plan of Vilnius, which set the maximum building intensity UI in the sites at $u_{max} \leq 3.0$ and the maximum building height h_{max} (not applicable to technological equipment) up to 35 m (high-rise buildings are possible in case of a special plan of high-rise buildings);
- fast access to the centre, the airport and the railway and bus stations;
- available water supply, rainwater drainage, sewerage, gas networks and telecommunication lines;
- increased air pollution in the environment and high traffic noise level;
- old type urbanised environment.

5. DESCRIPTION OF THE COMPARABLE PROPERTIES

The data about similar actual land sales transactions in Vilnius obtained from the State Enterprise "Registrų Centras" was used in calculations of the market value of the appraised site. The main issue of valuation in this case is related to the fact that few land sales transactions related to land for other purposes (construction and use of private houses/buildings) were recorded last year in the neighbouring territory of the appraised site, because the

territory is dominated by commercial land. Therefore, in addition to two sites actually sold 5 and 7 months ago, a site available for sale in the nearby Birželio 23-iosios Street was considered as well. The analysis of land market revealed that the prices of sites for other purposes (private houses) in 2007 in Vilnius increased by 25 percent in average.

The address of the first comparable site (Comparable Property 1) is Algirdo Street 14, Naujamiestis Neighbourhood, Vilnius, at a distance of about 1 km from the appraised site and the city centre (Table 1 and 3). This site shares the purpose with the appraised site: other purposes – for private houses. The area of the site is 8.66 ares, it is of a rectangular shape and the following networks are available: water supply, rainwater drainage, sewerage, gas and telecommunications. This comparable property is in a better location that the appraised site: the shopping centre "Maxima" and the 3rd Police Commissariat of the City of Vilnius are located at a distance of 200 metres, while the bank "Snoras" and Vilnius Mindaugas Secondary School are located at a distance of 100 metres. Like the appraised site, this site is empty – there are no buildings in it. The situation with environment pollution in this site is better than in the appraised site, because the traffic in Algirdo Street is slower than in Švitrigailos Street. The site was sold 5 months ago for LTL 1,750 thousand, i.e. LTL 202,079 for 1 are.

The second comparable site (Comparable Property 2) is located in Krivių Street. This site shares the purpose with the appraised site: other purposes – for private houses. The area of the site is 8.40 ares, it is of a rectangular shape and the following networks are available: water supply, rainwater drainage, sewerage, gas and telecommunications. This comparable property is in a better location than the appraised site and Comparable Property 1. It is located in a prestigious and quiet neighbourhood of residential houses near the Old Town and the city centre. Like the appraised site, this site is empty – there are no buildings in it. This site is in a better location in the sense of environment pollution than the appraised site and Comparable Property 1, because the traffic is slow in Krivių Street, the national cultural reservation of Vilnius castles is located nearby and there are many trees. The site is close to a few schools, colleges and shopping centres. The site was sold 8 months ago for LTL 1,500 thousand, i.e. LTL 178,571 for 1 are.

The third comparable site (Comparable Property 3) is located in Birželio 23-sios Street, Naujamiestis Neighbourhood, at a distance of about 600 metres from the appraised site. This site shares the purpose with the appraised site: other purposes – for private houses. The area of the site is 8.28 ares, it is of a rectangular shape and the following networks are available: water supply, rainwater drainage, sewerage, gas and telecommunications. There is a low-value building in the site – a garage. This comparable property is in similar location as the appraised site. There is the shopping centre "RIMI" at a distance of 200 metres, the furniture and interior centre "Skraja" at a distance of 300 m and the Chief Police Commissariat of the City of Vilnius nearby. This site is in a better location in terms of the environment pollution than the appraised site, because the traffic in Birželio 23-sios Street is slower than in Švitrigailos Street. At the time of valuation this site is available for sale for LTL 1,982 thousand, i.e. LTL 240,000 for 1 are.

One feature shared by all three comparable properties is that, according to the provisions of the General Plan of the City of Vilnius for 2015, residential buildings constructed in these sites must be up to 5 storeys. Analysis of the available parking space reveals the same situation in the appraised site and in Comparable Properties 1 and 2 (parking space on the street), while Comparable Property 3 has available spaces in a parking lot.

6. CALCULATION OF THE SITE'S VALUE

Zavadskas and Kaklauskas (1996) have developed the multiple criteria complex proportional assessment method for evaluation of construction projects. This method has been successfully applied for diverse multipurpose problems: in property valuation (Malienė, 2000), in rational decision-making on renovation of buildings (Kaklauskas et al., 2005, 2006; Mickaitytė, 2008; Mickaitytė et al., 2008; Karbassi et al., 2008), in selection of building walls (Ginevičius et al., 2008; Zavadskas et al., 2008a), in valuation of building lifecycle (Banaitienė et al., 2008; Turskis, 2009), in selection of variants for facilities management (Lepkova et al., 2008), in evaluation of contractors managing apartment houses (Zavadskas et al., 2009), in selection of project managers (Zavadskas et al., 2008b), in multiple criteria analysis of property of energy companies (Šliogerienė et al., 2009), in decision-making processes of real estate negotiations (Urbanavičienė, 2009; Urbanavičienė et al., 2009), in evaluation of contractors (Tamošaitienė, 2009; Andruškevičius, 2005; Zavadskas et al., 2009), in selection of rational processes of construction technology (Malinauskas and Kalibatas, 2005), in evaluation of a sustainable residential neighbourhood (Viteikienė, 2006; Viteikienė, 2008) and in solution of other numerous tasks (Datta et al., 2009; Ginevičius and Ginevičienė, 2009; Ginevičius and Podvezko, 2008a, 2008b, 2009; Mazumdar, 2009; Bivainis and Drejeris, 2009; Naimavičienė, 2008; Banaitis and Banaitienė, 2007).

A real estate multiple criteria method based on the said method was used in property valuation. It is the multiple attribute market value assessment method (MAMVA), which helps to determine the market value of the appraised property after several calculation cycles. In MAMVA method, the criteria related to the appraised site and to the comparable sites are provided in a grouped decision-making matrix, the columns of which correspond to the analysed objects n (appraised and comparable) and the lines give quantitative and conceptual information (Zavadskas et al., 2008c). In the grouped decision-making matrix, the criteria are classified into two groups: quantitative and qualitative. The multiple criteria real estate valuation method includes 12 stages. **Stage 1** is dedicated to creation of a system of factors that affect the market value of the item. **Stage 2** is dedicated to determination of measuring units, values and initial weights of the factors. **Stage 3** is dedicated to compilation of a normalised decision-making matrix D: comparable indicators are converted into non-dimensional values using the following formula:

$$d_{ij} = \frac{x_{ij} \cdot q_i}{\sum_{j=1}^{n} x_{ij}}, \quad i = \overline{1,\ m}; \quad j = \overline{1,\ n}. \tag{1}$$

here: x_{ij} is the value i of the factor j of the comparable site; m is the number of factors; n is the number of comparable sites; q_i is the weight of the factor i.

Stage 4. The sums of minimising S_{-j} and maximising S_{+j} evaluated normalised indicators describing the variant j are calculated using the formula:

$$S_{+j} = \sum_{i=1}^{m} d_{+ij}; \ S_{-j} = \sum_{i=1}^{m} d_{-ij};$$
$$i = \overline{1,\ m}; \ j = \overline{1,\ n}. \tag{2}$$

Stage 5. The relative weights (efficiencies) of comparable sites are determined on the basis of their positive qualities S_{+j} (pluses) and negative qualities S_{-j} (minuses). The relative weight Q_j of each variant a_j is determined using the following formula:

$$Q_j = S_{+j} + \frac{S_{-\min} \cdot \sum_{j=1}^{n} S_{-j}}{S_{-j} \cdot \sum_{j=1}^{n} \frac{S_{-\min}}{S_{-j}}}, \quad j = \overline{1,\ n}. \tag{3}$$

Stage 6. The priority order of the sites is determined. The higher Q_j, the more efficient (higher priority) is the variant.

Stage 7. The utility degree N_j of the site a_j is calculated using the formula:

$$N_j = \frac{Q_j}{Q_{\max}} \cdot 100\%. \quad (4)$$

Stage 8. The efficiency degree E_{xj} of all variants a_j is calculated. It shows the percentage at which object a_x is better/worse than object a_j:

$$E_{xj} = N_x - N_j, \; j = \overline{1,n}. \quad (5)$$

Stage 9. The mean deviation k_x of the utility degree N_j of the site a_x is calculated:

$$k_x = \sum_{j=1}^{n} E_{xj} : (n-1). \quad (6)$$

Stage 10. If the mean deviation k_x of the utility degree N_j of the appraised site calculated in Stage 9 does not satisfy the condition:

$$|k_{ax}| < 1\%. \quad (7)$$

then the stage 11 follows.

Stage 11. Correction of the value V_{xp} of the appraised site using the formula:

$$V_{xp} = C_x \, (1 + k_x : 100). \quad (8)$$

here: V_{xp} is the corrected value of the appraised site; C_x is the corrected value of the appraised site after the n^{th} approximation and k_x is the mean deviation of the utility degree N_j of the appraised site after the n^{th} approximation. The value of the appraised site is corrected using the approximation method, until the mean deviation k_x of the utility degree of the appraised site in the approximation cycle satisfies the condition 7. When condition 7 is satisfied (Stage 10), we proceed to Stage 12.

Stage 12. Calculation of the market value V_x of the appraised site:

$$V_x = C_x \, (1 + k_x : 100). \quad (9)$$

here: V_x is the site's market value.

7. INVESTIGATION PROCESS AND SUMMARY OF THE RESULTS

Regarding the main characteristics of qualitative, quantitative and market descriptions of the appraised site and the comparable sites, a grouped decision making matrix was formed (Table 1). This matrix was complied to calculate the value of the site located in Švitrigailos Street XX, Vilnius, and to assess the positive and negative features of the appraised property and the comparable properties in an integrated manner. The system of criteria was compiled from all possible criteria, which define the quantitative and qualitative features of the appraised property and comparable properties. The weights of the criteria were determined using the expert method – a survey of market participants, such as buyers, sellers, appraisers and intermediaries. The sales prices of Comparable Properties 1 and 2 are realistic, i.e. they have not been exaggerated or lowered due to personal issues of the market participants and other unforeseen circumstances. It may be claimed that all criteria that affect the market value of this type of appraised property have been foreseen. Comparable Site 1 was sold 5 months ago and Comparable Site 2 was sold 8 months ago. The time of selling of Comparable Site 3 available for sale is the same as the time of the appraised site; therefore, the time correction coefficient is disregarded. The weight of the sales price criterion equal to 0.5 was considered as equal to the sum of weights of all other criteria that affect the market value.

In the decision-making matrix, quantitative criteria, such as the sales prices of the comparable sites, their areas, the time of selling

and allowed building height in the site, were expressed in quantities, such as thousand LTL, ares, months, units; while the qualitative criteria were measured in points determined through selection of the beast value of a specific property and attribution of relative values to other properties. For instance, in terms of adjacent structures the site in Algirdas Street (Comparable Site 1) is the best, thus the highest value equal to 1 was attributed to the criterion for this site, while the appraised site in this sense is worse and was attributed the value of 0.5. Comparable Site 3 is worse than Comparable Site 1 in terms of adjacent structures, thus the value of its criterion is also lower and equal to 0.6. The adjacent structures of Comparable Site 2 are better than those of Comparable Site 3 and the appraised site but worse than those of Comparable Site 1, thus the value of its criterion is 0.8.

The weights of criteria that define the impact on the market value of the site were determined with the help of the expert method. For example, the most important factors that affect the market value of the property with such purpose (sites) are as follows: site position (weight 0.0669), prestige of the location (0.0452) and available parking (0.0452). The results of multiple criteria evaluation are shown in Table 2.

The value of the site was estimated in 2 cycles of refinement, until the mean deviation k_x, of the utility degree of the appraised site calculated in Stage 2 of the method satisfied the condition $k_{ax} < 1\%$ (Table 3). The value of the appraised site calculated in the second approximation cycle makes up LTL 1,726,560 ≈ LTL 1,730,000. It is the final market value of the site calculated using the MAMVA method.

Table 1. Initial data for multiple criteria decision-making related to the site

No.	Criteria under evaluation	Measuring units of criteria	*	Weights of criteria	S	1	2	3
1	Sales price	thousand LTL	–	0.5	1,744.00	1,750.00	1,500.00	1,982.00
2	Land purpose	Points	+	0.051	0.8	0.8	0.8	0.8
3	Site area	Ares	+	0.0215	6.89	8.66	8.4	8.26
4	Site position	Points	+	0.0669	0.5	0.8	1	0.6
5	Electricity	Points	+	0.0215	0.8	0.8	0.8	0.8
6	Water supply	Points	+	0.0154	0.6	0.6	0.5	0.6
7	Gas	Points	+	0.0219	0.6	0.7	0.8	0.8
8	Sewerage	Points	+	0.016	0.5	0.5	0.5	0.6
9	Time of selling	Months	–	0.023	0	5	8	0
10	Prestige of the location	Points	+	0.0452	0.4	0.7	1	0.5
11	Pollution levels	Points	–	0.0295	1	0.8	0.5	0.6
12	Noise	Points	–	0.0157	1	0.8	0.6	0.6
13	Allowed number of storeys	Number	+	0.0902	9	5	2	5
14	Available parking	Points	+	0.0422	0.4	0.7	0.6	1
15	Adjacent structures	Points	+	0.04	0.5	1	0.8	0.6

Table 2. The results of multiple criteria evaluation

No.	Criteria under evaluation	Measuring units* of criteria		Weights of criteria	S	1	2	3
1	Sales price	thousand LTL	–	0.5000	0.1250	0.1254	0.1075	0.1421
2	Land purpose	Points	+	0.0510	0.0127	0.0127	0.0127	0.0127
3	Site area	Ares	+	0.0215	0.0046	0.0058	0.0056	0.0055
4	Site position	Points	+	0.0669	0.0115	0.0185	0.0231	0.0138
5	Electricity	Points	+	0.0215	0.0054	0.0054	0.0054	0.0054
6	Water supply	Points	+	0.0154	0.0040	0.0040	0.0033	0.0040
7	Gas	Points	+	0.0219	0.0045	0.0053	0.0060	0.0060
8	Sewerage	Points	+	0.0160	0.0038	0.0038	0.0038	0.0046
9	Time of selling	Months	–	0.0230	0.0000	0.0088	0.0142	0.0000
10	Prestige of the location	Points	+	0.0452	0.0070	0.0122	0.0174	0.0087
11	Pollution levels	Points	–	0.0295	0.0102	0.0081	0.0051	0.0061
12	Noise	Points	–	0.0157	0.0052	0.0042	0.0031	0.0031
13	Allowed number of storeys	Number	+	0.0902	0.0387	0.0215	0.0086	0.0215
14	Available parking	Points	+	0.0422	0.0063	0.0109	0.0094	0.0156
15	Adjacent structures	Points	+	0.0400	0.0069	0.0138	0.0110	0.0083
Total sum of maximizing normalized balanced rates S+j					0.1054	0.1139	0.1063	0.1061
Total sum of minimizing normalized balanced rates S-j					0.1404	0.1465	0.1299	0.1513
Site's significance Qj					0.2486	0.2511	0.2611	0.239
Site's utility degree Nj					95%	96%	100%	92%
Site's priority					3	2	1	4
Supply price					1,744.00	1,750.00	1,500.00	1,982.00
Market value					1,726.56	1,750.00	1,500.00	1,808.15

Table 3. Estimation of changes in the mean deviation of the utility degree, the corrected value and the market value of the appraised property

Approximation cycle	The corrected value of the property	It is determined whether the corrected value of the appraised property has been calculated with sufficient accuracy
1	1,744.00	$\|-1.00\| < 1\%$
2	1,726.56	$\|0.01\| < 1\%$

The said site was also valuated using the individual valuation procedure, which is the property valuation technique valid in the Republic of Lithuania. This valuation method was selected considering the aspects that, in appraiser's opinion, best reflect the property's value. Sure, from the market perspective, comparison of real estate sales prices is the most legitimate method of market value calculation. Valuations based on price comparisons

are conditional, because one must know sufficient amount of sales prices of comparable properties. On the other hand, such properties must be similar. At least, the differences between factors comprising the value must be determined. Generally, not only the condition but also the price of real property must be compared. If these two main conditions are satisfied, the sales comparison method is preferred over other methods, because direct comparison of sales prices is the most reliable way to determine the market value. Therefore, the paired comparison approach of the sales comparison method was used. Selection of comparable properties may also be based on the interpretation of the concept of market value (Raslanas, 2001). If the market value is interpreted as the most probable sales price of the appraised property, then the properties must be selected on the basis of the regression-correlation analysis of real estate prices (Raslanas et al., 2006). It is especially true if the number of sales transactions recorded during the defined period is high and the prices are very diverse.

In general, a sales transaction is considered appropriate for comparison if it meets the conditions of suitability. In order for a sales transaction to be appropriate for comparison with the appraised property, it must be in the same neighbourhood, be of similar quality and of similar age (difference within 5 years) and must be in a residential area that may vary up to 15 percent (Kettani and Khelifi, 2001). Besides, the date of its selling cannot exceed 12 months after the date of valuation. Thus we have introduced a similarity index, which must determine the degree of similarity between the comparable property and the appraised property considering certain characteristics, which are called similarity features and are intended for that specific purpose. They can mark the location of the property, architectural styles, age, etc. This coefficient may take a value between 0 and 100, and this value affects the degree of similarity of the comparable property and the appraised property.

Thus the essence of the sales comparison approach is comparison, which means that the market value of property is determined through comparison of actual sales prices of comparable properties also considering small differences between the appraised property and its equivalent properties. The general market value of the appraised property is calculated using the formula:

$$MV = SP + AV. \quad (10)$$

here: MV is the market value of the appraised property; SP is the sales price of the comparable property and AV is the value of corrections.

In our case, the comparable properties have several parameters that differ from the appraised property, thus a few correction coefficients are used and the formula (10) looks as follows:

$$MV = SP \times K_1 \times K_2 \times K_3 \times ... \times K_n \pm IV \quad (11)$$

here: MV is the market value of the appraised property; SP is the sales price of the comparable property; K_1 K_2, K_3,K_n are correction coefficients that consider the differences between attributes related to the appraised property and to the comparable properties; IV is the value of additional improvements (it may be either positive or negative).

The correction values were calculated using the following correction coefficients: time, area, purpose, location, networks and the source of data.

After evaluation of all sites selected for comparison and calculation of the corrected prices, we note certain variations thereof. The corrected price of 1 are varies between LTL 195,428.57 and LTL 228,000.00. Therefore, the values must be adjusted. The table of corrections shows that Comparable Site 3 has

the lowest general correction coefficient equal to 0.95. Thus we attribute the highest weight equal to 3 to this property. Comparable Site 2 has the highest correction equal to 1.09. Therefore, its weight is equal to 1. Table 5 shows adjustment of the values.

Table 4. Comparative data

Date	Appraised site	Comparable Site 1		Comparable Site 2		Comparable Site 3	
Address	Švitrigailos g. XX, Vilnius	Algirdo g. 10..20, Vilnius		Krivių g., Vilnius		Birželio 23-iosios g., Vilnius	
Sales price, LTL		1,750,000.00		1,500,000.00		1,982,400.00	
Price of one are, LTL		202,079.00		178,571.43		240,000.00	
Valuated property	Site	Site	Correction	Site	Correction	Site with a building (low value)	Correction
Source of date		Centre of Registers	1	Centre of Registers	1	Data of the offer	0.95
Corrected price		202,079.00		178,571.43		228,000.00	
Sales time		Oct. 2007	1.1	Jul. 2007	1.14	March 2008	1
Corrected price		222,286.90		203,571.43		228,000.00	
Site area, ares	6.89	8.66	1.00	8.40	1.00	8.26	1.00
Corrected price		222,286.90		203,571.43		228,000.00	
Purpose	Other purposes (construction and use of private houses/buildings)	Other purposes (private houses)	1.00	Other purposes (private houses)	1.00	Other purposes (private houses)	1.00
Corrected price		222,286.90		203,571.43		228,000.00	
Location	good	very good	0.96	very good	0.96	good	1.00
Corrected price		213,395.42		195,428.57		228,000.00	
Networks	available	available	1.00	available	1.00	available	1.00
Corrected price		213,395.42		195,428.57		228,000.00	
General correction			1.06		1.09		0.95
Corrected price of 1 are		213,395.42		195,428.57		228,000.00	

Table 5. Adjustment of the values

Data	Comparable Site 1	Comparable Site 2	Comparable Site 3
Corrected price	213,395.42	195,428.57	228,000.00
Weight	2.00	1.00	3.00
Product	426,790.85	195,428.57	684,000.00
Sum of products			1,306,219.42
Sum of weights			6.00
Adjusted value			217,703.24

The value of 1 are after the adjustment of values is equal to LTL 217,703.24. Thus the market value of the appraised site is equal to:

6.89 ares × 217,703.24 LTL/a =
LTL 1,499,975 ≈ LTL 1,500,000.

The market value of the appraised property determined on 12 March 2008 using the sales comparison approach is equal to LTL 1,500,000 (one million five hundred thousand Litas).

The value determined after a mass valuation procedure, i.e. a search for the average market value on the basis of the unique number in the value zone 57.11 that includes the appraised site, made up LTL 511,370 (Figure 3). Thus the values of the same site determined using three different methods of valuation are rather diverse (Table 6).

The tax value of the site determined with the help of the mass valuation approach is by 65.9 percent lower than the value of the sales comparison approach and by 70,4 percent lower than the value of the MAMVA method. Meanwhile, the values determined using MAMVA and individual valuation differ by 13.3 percent. If the site would be taxed at the current rate of 1.5 percent based on these values, then the land tax would make up LTL 25,950 using the value determined by the MAMVA method and LTL 22,500 under the sales comparison approach. While the current tax makes up only LTL 7,670.55 and is 3.38 times and 2.93 times lower, respectively.

Determination of the basis for the real property tax is the main issue that must be solved to make this tax transparent and stable and its administration cheap and efficient. The real market value of a site should be taken as the tax basis. As we see, fairness of the land tax is not ensured, because the tax value makes up only about 30 percent of the market value although it should correspond to the market value. Highly inaccurate valuation prevents municipal budgets from considerable tax revenue and the tax efficiency is low.

Note: The zone is marked in yellow and its borders in green.

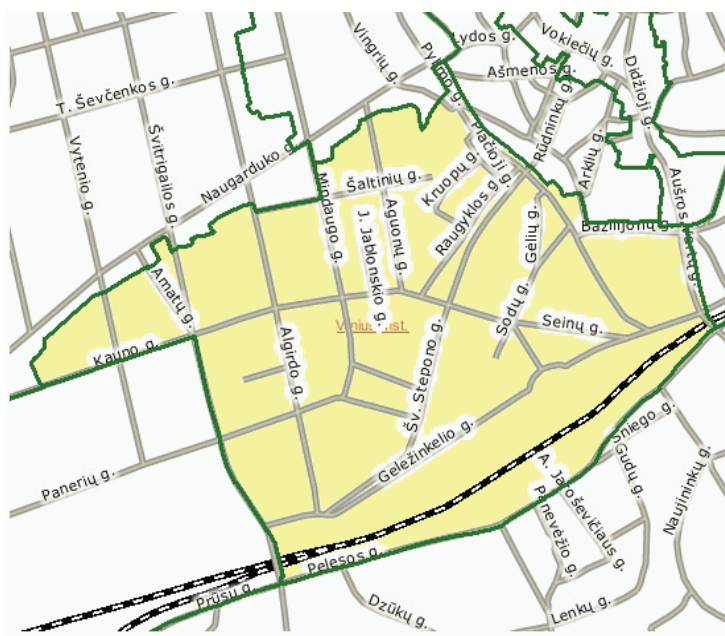

Figure 3. The value zone 57.11, which includes the subject

Table 6. Comparison of the values of the site in Švitrigailos Street XX (LTL)

MAMVA method	Sales comparison approach	Mass valuation
1,730,000	1,500,000	511,370
Size of the land tax (LTL)		
25,950	22,500	7,670.55

8. CONCLUSIONS

The current real property tax system in Lithuania is inefficient and fails to ensure steady and continuously growing revenue. The real property taxes are *ad valorem* taxes and, within the last decade, the prices of real estate have been growing faster than the revenues related to real property taxes, thus the system's operation was defective. The main reason is insufficient administration of these taxes and gaps in laws:

- the taxes are not global;
- tax values do not correspond to market values; and
- tax benefits and other exceptions.

For calculation of the tax values of land, we recommend using the average market values within value zones obtained after a mass valuation procedure. The multiple attribute market value assessment method (MAMVA) is suggested as the controlling method of valuation and as a tool for handling of appeals related to tax values.

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SANTRAUKA

ŽEMĖS VERTĖS MOKESTIS DARNIOS MIESTŲ PLĖTROS KONTEKSTE IR VERTINIMAS. II DALIS – ŽEMĖS VERTINIMO TECHNIKŲ ANALIZĖ: VILNIAUS ATVEJIS

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Antroje šio straipsnio dalyje nagrinėjamos problemos, susijusios su žemės sklypų vertinimu. Tuo tikslu buvo parinktas konkretus 6,89 arų ploto žemės sklypas, esantis Švitrigailos g. XX, Vilniuje, ir įvertintas trimis būdais: lyginamosios vertės, MAMVA metodais ir masinio vertinimo būdu. Apžvelgti šių metodų taikymo ypatumai vertinant žemės sklypus, pateiktos rekomendacijos, kaip nustatyti mokestines žemės sklypų vertes ir pritaikyti siūlomam naujam Lietuvos nekilnojamojo turto apmokestinimo modeliui.