Application of a New Multiple Criteria Analysis Method in the Valuation of Property

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Key words: commercial premises, valuation, multiple criteria decision-making, decision-making matrix, real estate.

ABSTRACT

A number of problems in the valuation of real estate can be eliminated by using methods of multiple criteria decision-making. These methods came into existence only during the second half of the 20th century. Currently, these methods have become important throughout international practices of real estate valuation. In most cases methods are based on market modeling and economic assumptions. Sometimes methods are referred to as separate valuation methods, and classified as modern ones.

This article describes a new method of multiple criteria decision-making developed by author. The new method is based on a market decision-making the valuation principle, and is in line with the traditional comparative value method. Therefore, the new method can be attributed to the group of indirect comparative value methods. Such methods facilitate the universal and more extensive multiple criteria decision making of a real estate. They take in to account a number of different criteria, such as qualitative, quantitative aspects and market conditions. The proposed method can meet demands and needs of many interested groups since it enables the estimation of not only the market value of the real estate, but also other values, e.g. investment value, value of use, and market value of the current use of the real estate. This article describes the theoretical model of the method, which was used as example to estimate the market value of commercial premises.

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1. INTRODUCTION

Real estate is one of the elements in the market economy which is undergoing the most rapid development in Lithuania. Real estate has many characteristics, most commonly it is valued as a reliable investment, commodity, security, dwelling place, and a place for business activities. Real estate, therefore, affects a range of stakeholders such as the State, valuers, investors, sellers, buyers, creditors and brokers (Fig. 1). Having analysed the concepts of the value theory and real estate valuation methods used in different countries, it is evident that the current real estate valuation principles are not strictly defined in Lithuania and cannot be used as a single valuation model. In comparison to other classical real estate valuation methods and based on the market principles, the comparable value method has the most solid basis for use in Lithuania. However, this method sometimes fails to provide a mathematical definition of the real estate value and to meet the needs and requirements of all interested parties. In addition there are often not enough comparable real estate transactions in Lithuania. This creates a need for a broader and more real estate valuation methodology, based on the assessment of many different criteria, which leads to the selection and use of a multiple criteria decision making of the real estate.

A number of problems in the valuation of real estate can be eliminated by applying methods of multiple criteria decision making. These methods are relatively new internationally and especially new, locally in Lithuania. Currently, these methods have become important in international practices of real estate valuation in Lithuania. In most cases these methods are based on market modeling and economic assumptions. Therefore, they sometimes are referred to as separate valuation methods, and classified as modern methods.

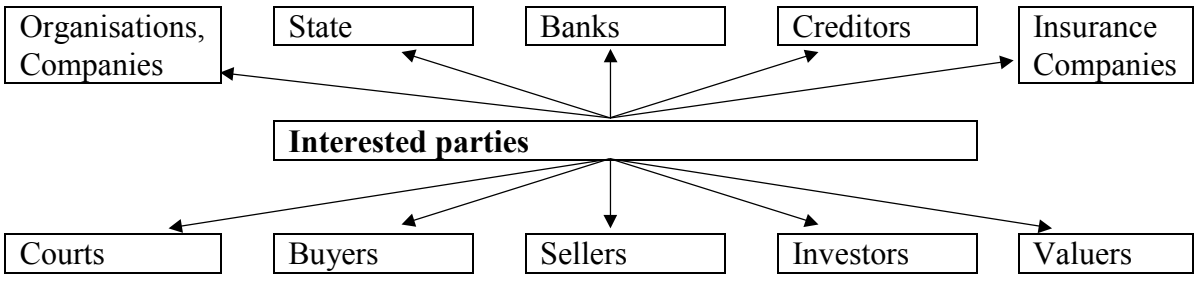

Figure 1. Interested parties in real estate, which can apply methods of multiple criteria decision making in their activities

Sommer and Zimmermann (1991) built systems of typical criteria which in the application of multiple criteria decision making methods allows the estimation of_qualitative and market differences between the comparable real estate and the real estate under valuation. Drisch and

Schürken (1995) adjusted the method of multiple criteria decision making to estimating the depreciation of real estate. For this purpose scientists have built systems of typical criteria, which are used in estimating the reduction in the value of the real estate due to its depreciation.

This article describes a new method of multiple criteria decision making. This particular method, based on market decision making and valuation principles, is in line with the traditional comparative value method. It can be attributed to the group of indirect comparative value methods. These methods facilitate the universal and more extensive multiple criteria decision making of real estate, since they take into account a number of different criteria, i.e. qualitative and quantitative aspects and market conditions. The proposed method meets the demands and needs of many interested groups bacause it enables the estimation of not only the market value of the real estate, but also other values, e.g. investment value, value in use, and market value. This article describes the theoretical model of the method, which was used as example to estimate the market value of commercial premises.

2. PREPARATION OF THE INITIAL DATA FOR MULTIPLE CRITERIA DECISION MAKING

A decision-making matrix must be prepared in order to carry out the multiple criteria decision making of real estate. The matrix is prepared through the decision making about the quantitative and conceptual information of the real estate to be valued and the estimation of the criteria values and weights.

One of the key stages in preparing the initial data is to create and build a decision making matrix, which is prepared in the following four stages (Zavadskas et al., 1998):

1. All information about the real estate to be valued is collected;
2. The criteria defining the aims of the multiple criteria decision making are determined;
3. Values, weight and units of measurement of criteria, of comparable alternatives are defined;
4. Criteria, their value and weight form the grouped decision making matrix (Table 1).

To carry out the multiple criteria analysis of property it is necessary to collect information describing qualitative and quantitative characteristics of the property. If the given pieces of property belong to different property markets, and the purpose of the multiple criteria analysis is to estimate the market value of these objects, it is necessary to collect information about the conditions of the market of the given properties (property supply and demand in a respective location). All information pertaining to the pieces of property is presented in quantitative and conceptual forms. The description of the pieces of property in quantitative and conceptual forms includes different relevant aspects (economic, technical, technological, infrastructure, qualitative (architectural, aesthetic, comfort-related), legal, social, etc.).

The system of criteria describing pieces of property under analysis is drawn up taking into account the goals of the interested parties. To determine the highest and best use of the

property, which meets the specific purpose of property use, the system of criteria describing the utility of the property's purpose of use is built. Systems defining the market value and other value types comprise criteria influencing the market value or other value types of the property. To achieve the above-mentioned goals, systems of criteria are built on the basis of the market analysis of the given property, international scientific sources and experts' opinions. To meet the needs of other interested parties, the systems of criteria defining priorities of personal needs are designed.

One of the most important stages in multiple criteria decision making of real estate is the determination of the values and weight of the criteria describing the real estate. Weight of the criteria, defining the quality and quantity of the objects to be valued and values of the qualitative criteria for the alternatives are estimated by the application of expert, normative, calculation and analogue methods.

Usually, the following methods for the estimation of weights of quantitative criteria are used: the expert method, normative method, the calculation method, and the analogy method. When the normative method is used, criteria weights are estimated on the basis of recommendations, legal provisions, estimates, etc. When the calculation method is used, the required data are determined by using practical and theoretical dependencies, statistical data, and different formulas. In the analogy method, the given object (whose criteria weights have not been determined) is compared with the analogue, selected in accordance with the requirements set for the object under consideration. Having analysed characteristics of the object and the analogous property, readjustment coefficients are determined. Missing criteria~~'s~~ weights of the object under analysis are estimated by multiplying the necessary criteria~~'s~~ weight of the analogue property by the readjustment coefficients.

When the calculation is performed in accordance with the experts method, the qualitative values of a criteria can be expressed in a certain number of points. Criteria can be estimated according to the increase or decrease of the valuation scale.

To estimate the proportional values of the qualitative criteria, the expert's valuation is based on a comparison. In this case, the values of the qualitative criteria can be estimated as follows (Zavadskas et al., 1997):

- The best suitable value of the criterion x_{best} is selected;
- The value of the best selected criterion is set, equal to the magnitude of one point ($x_{best} = 1$);
- The ratio between the best criterion's value ($x_{best} = 1$) and remaining values (x_i) of the same criterion is estimated and expressed in a percentag (p_i);
- The relative values are attributed to the remaining values of the criterion ($x_i = 1 - p_i \div 100$);
- Relative values of all criteria are set equal to the magnitude of one point.

Table 1. Grouped decision-making matrix of a multiple criteria decision-making of the real estate to be valued

Quantitative information pertinent to objects									
Criteria under Consideration	*	Weight	Measuring units	Real estate to be valued					
				1	2	…	j	…	n
Quantitative Criteria	z_1	q_1	m_1	ax_{11}	bx_{12}	…	x_{1j}	…	x_{1n}
	z_2		m_2	ax_{21}	bx_{22}	…	x_{2j}	…	x_{2n}
	...	...	...	...	...	…	...	…	...
	z_i	q_i	m_i	ax_{i1}	bx_{i2}	…	x_{ij}	…	x_{in}
	...	...	...	...	...	…	...	…	...
	z_t	q_t	m_t	ax_{t1}	bx_{t2}	…	x_{tj}	…	x_{tn}
Qualitative Criteria	z_{t+1}	q_{t+1}	m_{t+1}	ax_{t+11}	bx_{t+12}	…	x_{t+1j}	…	x_{t+1n}
	z_{t+2}	q_{t+2}	m_{t+2}	ax_{t+21}	bx_{t+22}	…	x_{t+2j}	…	x_{t+2n}
	...	...	...	...	...	…	...	…	...
	z_i	q_i	m_i	ax_{i1}	bx_{i2}	…	x_{ij}	…	x_{in}
	...	...	...	...	...	…	...	…	...
	z_m	q_m	m_m	ax_{m1}	bx_{m2}	…	x_{mj}	…	x_{mn}
Conceptual information pertinent to real estate (texts, drawings, graphics, tapes)									
K_k	K_z	K_q	K_m	K_1	K_2	…	K_j	…	K_n

* – The sign z_i (+(-)) indicates that a greater (lesser) criterion value corresponds to a higher demand of the interested party

The initial weights of the criteria are determined in a similar way. The market price of the real estate reflects quality, quantity and the supply and demand for real estate. Therefore, the weight of the market price criterion for the given real estate is equal to the total sum of weight of all remaining criteria, i.e. to one point or 100 per cent. The weight of other criteria are determined by experts or other methods. Criteria weights in estimating the market value describe criteria influence upon the market value of the property.

The decision making matrix must be prepared in order to carry out the multiple criteria analysis of property. The matrix is prepared by analysing the conceptual information about the property under consideration, estimation of the criteria values and weights of the property. Having calculated the values and weights of criteria and by applying of methods of the multiple criteria analysis, one can prioritize the comparable pieces of property with respect to one another, their utility and values.

Descriptive information characterizing the property when the property is valued by applying the methods of multiple criteria analysis is systemized in a matrix form. The grouped decision-making matrix derived from the multiple criteria analysis of the property under consideration is presented in Table 1 where columns list *n* objects under consideration, and rows provide quantitative and conceptual information about them, which serves as an extensive description of the property. Description of pieces of property in quantitative and conceptual forms includes information covering different relevant aspects (economic, technical, technological, infrastructure, qualitative (architectural, aesthetic, comfort-related), legal, social, etc.). Quantitative information includes data on systems of criteria, units of measurement, values and initial weights, minimizing or maximizing criteria, information about the development of property under consideration. Description of such pieces of property in a conceptual form, text, schemes, graphic charts, diagrams, drawings, and tapes,

allows to obtain conceptual information about the objects and criteria characterizing them (description, reasons and rationale of the system of criteria, values and weights). Conceptual information is a supportive tool in carrying out a more precise and profound estimation of the property value, i.e. it helps not only to obtain more extensive information but also to build a thorough system of criteria, and determine values and weights of criteria.

In a grouped decision making matrix, criteria are classified into two groups: quantitative and qualitative criteria, and the criteria of market conditions, if necessary. This facilitates the multiple criteria analysis of property and makes the physical meaning of the calculations more visible. The multiple criteria analysis of property usually involves a large amount of information; therefore it is convenient to process it in a matrix form. This means that the property under consideration and quantitative and qualitative information describing the property are grouped in a certain sequence of order, which results in the grouped decision making matrix of the multiple criteria analysis pertaining to the property under consideration.

3. THE METHOD OF MULTIPLE CRITERIA DECISION MAKING FOR ESTIMATING REAL ESTATE VALUE

To find what price will make a valuated real estate competitive on the market, a method determining the market value of the real estate, based on the complex decision making of all their benefits and drawbacks, has been suggested. According to this method the real estate's utility degree and the market value of the real estate being estimated are directly proportional to the system of criteria that adequately describes them, the values and weights of criteria.

The method described in this article is used to achieve the main goal of estimating the market value of the given real estate. The value of the real estate, being valued, is determined by means of reiteration of the real estate through several repetitive cycles of refinement until the mean deviation k_x of the degree of utility N_j of the real estate a_x satisfies the condition $k_{ax} < \pm 1\%$. The initial value of the real estate under valuation is estimated according to the purchase prices of the comparable objects. The object's value is equal to the mean of purchase prices, of the comparable real estate. Value ax_{11} (Table 1) of the defined initial value criterion of the valued real estate changes in all refinement cycles. Values and weight of other criteria remain the same as were defined in the preparation of the initial data.

The essence of the method of multiple criteria decision making in estimating real estate value is presented. The method is composed of a total of 12 stages (Malienė et al., 1999; Zavadskas et al., 2000; Malienė et al., 2000):

Stage 1. Formation of the criteria system influencing the real estate value. Criteria affecting real estate value are established on a market decision making basis.

Stage 2. Determination of values, weight and measuring units of criteria. Qualitative criteria are measured in points, and quantitative criteria are expressed in standard measuring units, e.g. m^2, ha.

Stage 3. A normalised decision-making matrix D is formed. The purpose of this stage is to obtain dimensionless weighted values from comparative indexes. When the dimensionless

weighted values are known, it is possible to compare all the indexes of different units of measurement. The following formula is used for that purpose:

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

where x_{ij} - value j of criterion i of the object under consideration, valuation or comparison; m – number of criteria; n – number of the objects under consideration; q_i - weight of criterion i. The sum of the dimensionless weighted values d_{ij} of each criterion x_i always equals the weight q_i of this criterion:

$$q_{ij} = \sum_{j=1}^{n} d_{ij}, \quad i = \overline{1,m}; \quad j = \overline{1,n}. \qquad (2)$$

Stage 4. Sums of the calculated, normalised indices of the minimising indexes S_{-j} and maximising indexes S_{-j} characterising the j variant are calculated. They are calculated according to the following formula:

$$S_{+j} = \sum_{i=1}^{m} d_{+ij}; S_{-j} = \sum_{i=1}^{m} d_{-ij}; i = \overline{1,m} \; ; j = \overline{1,n}. \qquad (3)$$

In this case, the values of S_{+j} and S_{-j} express the degree to which the real estate being compared achieves the purposes of the interested parties. In any case, sums of all the pluses S_{+j} and minuses S_{-j} of the properties being compared are always equal to all the sums of weight of the maximising and minimising criteria:

$$S_{+j} = \sum_{j=1}^{n} S_{+j} = \sum_{i=1}^{m} \sum_{j=1}^{n} d_{+ij};$$

$$S_{-j} = \sum_{j=1}^{n} S_{-j} = \sum_{i=1}^{m} \sum_{j=1}^{n} d_{-ij}, \qquad (4)$$

$$i = \overline{1,m}; \quad j = \overline{1,n}.$$

Stage 5. The relative weight (effectiveness) of properties being compared is determined in accordance with the positive (+) S_{+j} and negative (-) S_{-j} qualities that characterise these properties. The relative weight Q_j of each alternative a_j is determined according to the following formula:

$$Q_j = S_{+j} + \frac{S_{-\min} \cdot \sum_{j=1}^{n} S_{-j}}{S_{-j} \cdot \sum_{j=1}^{n} \frac{S_{-\min}}{S_{-j}}}, \quad j = \overline{1,n}. \qquad (5)$$

Stage 6. Prioritisation of the properties being valued and their comparison is determined in this stage. The larger Q_j, the larger the effectiveness (prioritisation) of that alternative. The summarised criterion Q_j directly and proportionaly depends on the relative influence of values $_{xi}$ and weight $_{qi}$ of the criteria under comparison, in the final result.

Stage 7. The degree of utility N_j of the real estate a_j is determined according to the following formula:

$$N_j = \frac{Q_j}{Q_{\max}} \cdot 100\%. \qquad (6)$$

Stage 8. The degree of effectiveness E_{xj} of all objects under consideration is determined in this stage. Stage 8 shows by what percentage a real estate a_x is better or worse in comparison with another real estate a_j:

$$E_{xj} = N_x - N_j, \quad j = \overline{1,n}. \tag{7}$$

Stage 9. The mean deviation k_x of the degree of utility N_j of the real estate a_x is determined here by using the following formula:

$$k_x = \sum_{j=1}^{n} E_{xj} : (n-1) \tag{8}$$

Stage 10. If in stage 9**,** the mean deviation k_x of the degree of utility N_j of the real estate a_x being valued does not satisfy the condition:

$$k_{ax} < 1\%. \tag{9}$$

then one has to proceed to stage 11.

Stage 11. The value V_{xp} of the real estate being valued is refined according to the following formula:

$$V_x = C_x(1 + k_x{:}100); \tag{10}$$

V_{xp} is the refined value of the real estate being valued. C_x is the refined value of the real estate under valuation after the n-th iteration. k_x is the mean deviation of the degree of utility N_j of the real estate being valued.

The value of the real estate, being valued, is refined by means of reiteration through several repetitive cycles of refinement until the mean deviation k_x of the utility degree of the real estate satisfies the condition of formula 9. After the condition of formula 9 is satisfied at stage 10, then one proceed's to stage 12.

Stage 12. The value V_x of the real estate being valued is determined according to the following formula:

$$V_x = C_x(1 + k_x{:}100); \tag{11}$$

V_x is the value of the real estate being valued, C_x is the refined value of the real estate being valued after n-th iteration, k_x is the mean deviation of the degree of utility N_j of the real estate being valued.

The method of multiple criteria decision-making, in real estate valuation allows for the estimation of not only the market value of real estate but also other values, which ane based on market principles. In the application of this method, the complex decision making of real estate is carried out. The estimation is made, of the utility of the relevant real estate and their prioritization with respect to one another, as well as the weight of the criteria determining the value of the real estate, as mellas the competitiveness of the given real estate.

The method of multiple criteria decision-making in real estate valuation can be applied not only as a separate valuation method, but also as a combined method that includes traditional valuation methods:

– In the comparative value method it is important to estimate the separate criteria influencing the market value of real estate such as local infrastructure, and the position of the real estate being valued;

– In the value replacement method it isnecessary to estimate the depreciation of the real estate being valued.

The method of multiple criteria decision making in valuation, is based on market decision making and estimation, as well as the, application of qualitative, quantitative criteria and market conditions affecting the value of the real estate. This method allows one to perform a complex valuation of the real estate even when there are not only qualitative, quantitative differences in the objects being compared but also when there are differences in market conditions.

The method of multiple criteria decision-making is flexible and available to all interested parties and market players such as buyers, sellers, investors, valuers, and others striving to attain their goals and needs. It must also be remembered that criteria influencing value, differ for different valuation purposes. The number and weight of these criteria can be easily changed in the application of these methods.

4. ESTIMATION OF THE MARKET VALUE FOR COMMERCIAL PREMISES

Our research comprises a valuation case study employing the method described in this article. Two comparable objects were selected for the object being valued. Both are located in Vilnius. The object being valued and the comparable objects contain differences in quality, quantity and market conditions. The description of the object being valued and the comparable objects is presented further on in this paper.

4.1. Description of the Real Estate Being Valued

The real estate or commercial premises under valuation here, are located on Pylimo Street in Vilnius, 2 kilometers from the city center, next to the railway and bus stations (1 km). Pylimo street is one of the main city streets of the serves as a link between the city center. The premises being valued are located on the ground floor and in the cellar of the dwelling. Currently, those premises are being used as shops. The total area of the premises accounts for 390 m^2 including two salerooms of 115 m^2 each. The area of the auxiliary premises amounts to 160 m^2. There are two separate entrances to the premises, one from Pylimo Street, and the other from the end of the building where there is a car park. The premises on the ground floor are in good condition. Rooms have been renovated, the interior decoration is of high quality and interiors of the premises meet modern standards. Premises in the cellar are not being used. The four-story building where the premises are located was erected in 1940 and is used as a dwelling with commercial premises on the ground floor. The construction elements of the building include the following: the foundation is made of stone-concrete, walls are made of bricks, which have been plastered, the roof is covered with tiles, joist ceilings are made of Ferro-concrete. The physical depreciation of the building stands at 57 per cent. Functional and economic depreciations have been estimated by expert's method and make up 37 and 13 per cent, respectively. The premises, like the whole building, are equipped with water supply, sewage systems, electricity, gas, district heating and one telephone line. An alarm system is absent. The land plot is not included into valuation because it does not belong to a private owner. There are no restrictions on holding and possessing the real estate.

There is a great demand for non-dwelling properties in the parts of Vilnius where these two premises, under valuation, are located. The building is not far from the city center, and next to a busy street with heavy traffic flow. In the neighborhood, there are a lot of companies and other commercial offices. The premises being valued are marketable, due to the location of the building and characteristics of the premises. The premises are further suitable for commerce, because the doors and windows face the main street. The premises have been well renovated and are in good condition. The cellar contains enough space to be used for warehousing.

4.2. Description of the First Comparable Object

The comparable object (commercial premises) is located in Savanoriu Avenue in Vilnius. The premises are located 4 kilometers from the city center, and 5 km from the railway and bus stations. The comparable object is located in the Naujamiestis district that is one of the most prestigious districts of the city and so with real estate high prices. New buildings are not frequently built in this part of the city; therefore, there is a constant demand for premises. The premises are located on the ground floor and the cellar of the dwelling house has a warehouse in the yard of the building. The total area of the premises accounts for 334 m^2. There is one saleroom with an area of 155 m^2.

The area of the auxiliary premises amounts to 179 m^2. There is a separate entrance to the premises from Savanoriu Avenue. The premises interior decorations are as follows: the interior has been painted, one part of the walls in the saleroom is covered with tiles, and the other part is decorated with decorative planks. The premises overall still need to be renovated. The four-story building where the comparable object is located was erected in 1960 and is used as a dwelling with commercial premises on the ground floor. The construction elements of the building include the foundation which is made of concrete, interior walls made of bricks which are plastered, partitions made of bricks, the roof is covered with metal sheets, joist ceilings are made of Ferro-concrete; and it has wooden doors and windows frames. The physical depreciation of the building stands at 34 per cent. Functional and economic depreciations have been estimated by expert's method and make up 42 and 24 per cent, respectively. There is a warehouse in the yard of the building, which was sold together with the premises. The premises, except the warehouse, like the whole building, is equipped with water supply, sewage systems, electricity, gas, district heating and one telephone line. The alarm system is absent. The land plot was not sold with the building. There are no restrictions on the use or possession of the real estate.

The district where this real estate is located is a conglomeration of many enterprises, offices, and commercial companies. The object stands in a busy place next to main transport systems and highways with a heavy traffic flow. The premises are marketable due to the location's features. This object, located on a main street of the district, is suitable for commerce and trade because it has one entrance and its windows that face onto the street. Further, the real estate's position allows for good advertising conditions. There is an auxiliary building yard that is suitable for warehousing purposes. The premises, however, need more renovation and a modern interior. The selling price for the premises stands at 186.000 Lt (46.500$).

4.3. Description of the Second Comparable Object

The comparable object or commercial premises, is located on Gostauto Street, in Vilnius and is also part of the Naujamiestis district. The location of the premises is especially good because it is in the city center, and in the most prestigious district of Vilnius namely Gediminas Avenue and Zverynas streets. The premises occupy the cellar of an Institute and cover the total area of 308 m^2. There is one saleroom with an area of 216 m^2, plus auxiliary premises, with an area of 92 m^2. There are two entrances to the premises, one entrance is from the Institute and a separate entrance is from the yard. There is a large car park outside the premises. The interior decoration of the premises is as follows: the floor is covered with linoleum, walls are covered with paint or plaster and in some places with wallpaper. The main room has recently been renovated, i.e. it has been repainted and windows have been furnished with jalousies. The auxiliary premises have not been repaired. The building, where the object is located, was erected in 1965 and is a four-story building being used as an Institute. The construction elements of the building include the foundation which is made of concrete, outside walls made of bricks and/or plastered, surfaces partitions made of bricks, plaster, joist ceilings made of Ferro-concrete and/or plastered, one door which in solid-core, and double windows. The physical depreciation of the building stands at 29 per cent. Functional and economic depreciations have been estimated by the expert's method and make up 52 and 33 per cent, respectively. The premises, like the whole building, are equipped with water supply, sewage systems, electricity, gas, district heating and two telephone lines. There is a local alarm system on the premises. The land plot was not sold together with the building. There are no restrictions on the use or possession of the real estate.

Table 2. Initial data for multiple criteria decision making of commercial premises. Grouped decision-making matrix

Criteria to be considered		**Measurement unit**	**Weight**	**The object under valuation**	**Comparable objects**	
					Savanoriu Avenue	**Gostauto Street**
1. Selling price	-	Thousand Lt	100	X	186	130
Evaluation of the building						
2. Construction design	+	Points	3.5	0.85	0.80	1.00
3. Physical depreciation	-	Per cent	3.0	57	34	29
4. Functional depreciation	-	Per cent	2.5	37	42	52
5. Economic depreciation	-	Per cent	3.5	13	24	33
6. Number of Auxiliary buildings	+	Units	4.0	0	1	0
Quantitative assessment of premises						
7. Total area	+	m^2	5.5	490	334	308
8. Number of salerooms	+	Units	1.5	2	1	2
9. Area of salerooms	+	m^2	3.5	230	150	216
Qualitative assessment of premises						
10. Interior	+	Points	4.0	1.00	0.60	0.55
11. Exterior	+	Points	2.5	0.75	0.80	1.00
12. The need for renovation	-	Points	3.5	0.15	0.70	0.50
13. Trading equipment	+	Points	4.5	1.00	0.75	0.00
14. Number of entrances	+	Units	1.0	2	1	2
15. Entrances with respect to the street	+	Points	5.5	1.00	0.95	0.60
16. Position of showcases	+	Points	4.5	0.90	1.00	0.50
17. Advertising possibilities	+	Points	4.0	0.90	1.00	1.00

18. Location with respect to parts of the world	+	Points	0.5	0.60	0.80	1.00
Assessment of communications						
19. Engineering communications	+	Points	3.5	1.00	1.00	1.00
20. Number of telephone lines	+	Units	1.5	1	1	2
21. Assessment of alarm systems	+	Points	5.0	0.00	0.00	1.00
22. Assessment of air conditioning	+	Points	2.0	0.75	1.00	0.25
Estimation of the place						
23. Distance from city center	-	km	5.5	2	4	1
24. Public transport	+	Points	5.0	0.80	1.00	0.75
25. Distance from bus stops	-	km	1.5	100	200	50
26. Car Park	+	Points	5.0	0.70	0.50	1.00
Other criteria						
27. Prestige of locality	+	Points	7.5	0.90	0.80	1.00
28. Assessment of market conditions	+	Points	6.5	0.95	0.95	1.00

Table 3. Estimation of changes in the mean deviation of the degree of utility, the refined value and the market value of the real estate under valuation

Cycle of refinement	Refined value of the object under valuation V_{xp} (thousand Lt)	The mean deviation of the degree of utility of the real estate under valuation	Market value of the object under valuation V_x (thousand Lt)
1	156.00	$\|8.83\| > 1$	
2	171.95	$\|3.86\| > 1$	
3	165.31	$\|2.11\| > 1$	
4	161.82	$\|1.14\| > 1$	
5	159.98	$\|1.03\| > 1$	
6	158.33	$\|0.58\| < 1$	
			158.33 (1 – 0.58 ÷ 100) = 157.41

The site of the object is widely used for commercial activities. Public enterprises, banks, commercial companies and shops are located in this part of the city. The buildings are in a considerably good condition and made of long-lasting building materials. Buildings are being actively repaired, their interiors are being renovated and the ground floor premises are being rearranged into administrative and commercial offices. These premises are in the cellar where the entrance and show cases are facing behind of the building. In addition to this the premises need more renovation. Therefore, as commercial premises, these buildings have lower value, at present. The selling price for the premises stands at 130.000 Lt (2001 prices).

5. INVESTIGATION PROCESS AND SUMMARY OF RESULTS

Regarding the main characteristics of qualitative, quantitative and market descriptions of the real estate under valuation and the comparable objects, a grouped decision making matrix was formed (Table 2). The market value of the commercial premises was estimated in 6 cycles of refinement, until the mean deviation k_x, of the degree of utility of the real estate under valuation, calculated in stage 9 of the method, satisfied the condition $|k_{ax}|<1\%$. Table 3 of this article, illustrates changes in the mean deviation of the degree of utility of the real estate being valued and the refined value of commercial premises throughout all six cycles of refinement. In the last (sixth) cycle of refinement, the aforementioned condition, was satisfied and the market value of the premises was estimated to be 157.000 Lt (39 250$) (Table 3).

6. CONCLUSIONS

1. The method of multiple criteria decision making, is based on the market and real estate decision making and on the application and evaluation of the qualitative and quantitative criteria as well as market conditions which influence the value of real real estate. Therefore, this method allows one to carry out a complex decision making of the real estate including not only qualitative and quantitative differences but also different market conditions.
2. The proposed method is flexible and can be made available to all interested parties or market participants such as buyers, sellers, investors, valuers and others, seeking to satisfy their needs and different requirements. Besides, when evaluating the real estate for different purposes, the criteria influencing the value, differs as well and the method's flescibility adds to its stnengths. The number and weight of these criteria can be easily changed when applying the suggested methods.

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