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FORMATION OF A SYSTEM OF MULTICRITERIA INDICATORS FOR THE ASSESSMENT OF OFFICE LEASING OPTIONS

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ABSTRACT. With the growing scope of business and the internationalization of companies, office leasing is becoming an increasingly relevant issue. It has become an integral part of business and affects the results of commercial activities. The methods for the assessment of office leasing options that are available at the moment are imperfect, as they lack complexity and they are not related to the objective of the lease – the improvement of business results, imperfect methods for a quantitative assessment of the lease options, etc. The adequacy of the assessment of lease options largely depends on the system of indicators that is used. The system is formed on the basis of a list of indicators composed from different sources. For the system of indicators to fully reflect the analyzed phenomenon and to be suitable for a quantitative assessment, there have to be not too many or too few indicators in the system. This means that the indicators that are insignificant have to be eliminated from the list. The most precise way to do that is to apply methods of mathematical statistics. The research is based on the analysis of scientific literature and the methods of mathematical statistics.

KEYWORDS: Lease of offices; Indicators of lease options; Formation of a system of indicators; Multicriteria assessment; Expert assessment

1. INTRODUCTION

The formation of the system of indicators has a special role in multicriteria assessments. This is because the adequacy of the reflection of the analyzed phenomenon depends on this system. Despite its importance, this phase of the multicriteria assessment is not given enough attention. In some cases, the system of indicators is simply identified with a pre-formed list of indicators; and in other, where the question of eliminating or keeping certain indicators in the system is analyzed, it is done without a sufficiently methodical basis.

The list of indicators reflecting the analyzed phenomenon (AP) usually covers a potentially high number of indicators (Podvezko 2008; Zavadskas, Turskis 2011). It is considered that the more extensive the list, the better the AP is reflected. Secondly, the indicators on the list are not equally important to the analyzed phenomenon – some of them are insignificant. Such indicators should not be included in the system, which is the basis for the AP assessment, as they will not increase the accuracy of the assessment, but will significantly encumber the calculations. Thus, insignificant indicators should be eliminated. Generally, the following statements are followed when forming a system for a multicriteria assessment based on a list of indicators (Ginevičius, Podvezko 2005): first of all, the more indicators that are included into the system, the more accurate the reflection of the analyzed phenomenon will be; and conversely, the fewer indicators that are included into the system, the higher the risk is that significant AP indicators will remain unanalyzed and the assessment of the state of the AP may prove to be inadequate. Secondly, the more indicators that are included, the more indicators there will be that are difficult to formalize, and besides the system becoming more complex, it will be more difficult to accurately determine the significance of the indicators. As a

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result, the cost of the calculations will increase, and their accuracy will decrease. This leads to the conclusion that the number of indicators included into the system cannot be too low or too high.

An analysis of the sources of literature shows that there are two possible methods of forming a system of indicators. The first one is limited to those indicators mentioned most often in the sources of literature and other sources (Brauers *et al.* 2014; Ginevičius, Podvezko 2013; Nugaras, Ginevičius 2015). It is the most basic, but also a less accurate method. The second method uses the more complex but significantly more accurate methods of mathematical statistics (Ginevičius, Podvezko 2005; Ginevičius *et al.* 2013; Kondyli 2010; Boggia, Cortina 2010; Buracas *et al.* 2012; Mardani *et al.* 2015a, 2015b; Kim *et al.* 2015; Bausys, Zavadskas 2015; Keshavarz Ghorabaee *et al.* 2015; Hashemkhani Zolfani *et al.* 2016; Liu *et al.* 2016; Kou *et al.* 2016).

The aim of the article is to form a system of indicators for the leasing of commercial real estate objects (offices) from a list compiled by applying the methods of mathematical statistics. The research is based on an analysis of the scientific literature and on the methods of mathematical statistics.

2. FORMATION OF THE SYSTEM OF INDICATORS BY APPLYING THE METHODS OF MATHEMATICAL STATISTICS

An analysis of the sources of literature allows us to distinguish certain typical methods of the formation of a list of indicators for the analyzed phenomenon. In the simplest cases, indicators are included in the list without any justification. It would seem that the author bases their inclusion solely on his/her opinion; therefore, this is the most subjective way of forming a list (Azbainis, Rudzkienė 2011). The most common cases are when the list is based solely on the sources of literature (Russell 2002; Turskis *et al.* 2009; Ball *et al.* 2012; Pagourtzi *et al.* 2003; Golusin, Munitlak Ivanović 2009). The third method, which is rather rare, is when the list of indicators is based on an expert assessment. Another rare method is when a list is formed on the basis of the sources of literature and other sources, as well as expert assessment (French, Wiseman 2003; Nase *et al.* 2013; Joksiene, Zvirblis 2014).

The latter is the best method, as it evaluates international experience, and, thanks to the expert assessment also takes into consideration the specific aspects of the country where the research is taking place.

This article is based on this method of the formation of the list of indicators for the analyzed phenomenon. In any event, an initial table has been drawn up for the list of AP indicators highlighting the indicators most often mentioned or suggested in the sources of literature (Čeh *et al.* 2012; Nase *et al.* 2013; Au-Yong *et al.* 2014) as well as by the experts (Table 1).

Based on the sources of literature and other sources, as well as the opinions of 21 experts, Table 1 has been drawn up. 59 indicators were defined. All of them could be divided into three blocks according to their similarities: economic indicators – 14; indicators describing the atmosphere and potential of the premises – 27; and indicators describing the infrastructure of the environment and location – 18 (Fig. 1).

Table 1. Initial table for the formation of the system of indicators for the analyzed phenomenon

No.	Name of source	Indicators						
		1^{st}	2^{nd}	3^{rd}	...	i^{th}	...	n^{th}
1		+		+	...		...	+
2		+	+	+	...	+	...	
3				+	...	+	...	+
.		.	.	.	.	.	...	
.		.	.	.	.	.		
.		.	.	.	.	.		
I		+		+	...		...	+
.		.	.	.	...	.	...	.
.		.	.	.		.		.
.		.	.	.		.		.
M		+		+				+
	Total	$\sum_1$	$\sum_2$	$\sum_3$	...	$\sum_i$	...	$\sum_n$

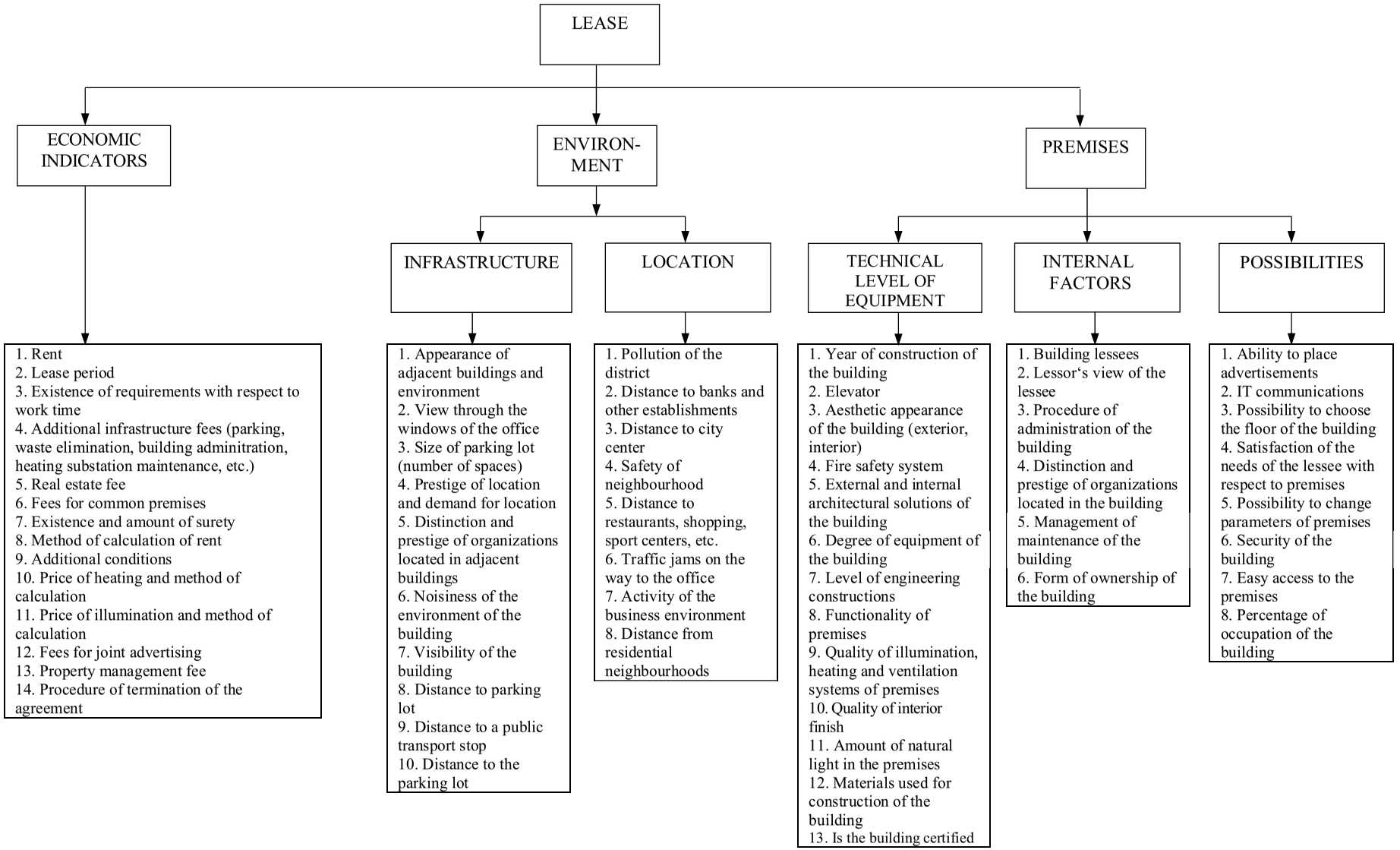

Fig. 1. System of lease indicators for commercial real estate objects (offices)

Such a grouping helps the experts to adequately rank the indicators according to their importance. The elimination of insignificant indicators is based on a histogram obtained by placing the indicators at respective intervals, according to their rate of mentioning, i.e. their rank. Its configuration is thus also the theoretical probability distribution of a random value X, whose description largely depends on the manner of grouping the ranks of the indicators. In order to draw up a histogram, first of all we need to rank the indicators of all three blocks, according to their importance. Rank 1 is given to the most important indicator and rank n – to the least important indicator (where n is the number of indicators in a block). In our case, the value X shows the number of times the same rank of the indicator was given in the questionnaires by the experts. Interval $[X_{i-1}. X_i J_F]$ shows that indicators n_i were mentioned in all questionnaires by the experts from $i - 1$ to i times, e.g. [0.6], $n_i = 4$. This shows that 4 indicators were mentioned in all questionnaires from 0 to 5 times (6 is not covered by the interval). The results of the ranking of all three blocks of lease indicators – economic, environment and premises – are presented in Tables 2–4.

Table 2. Results of the ranking of importance of the economic lease indicators

No.	Name of indicator	Experts																					Total
1.	Rent	1	1	1	2	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	27
2.	Lease period	14	12	13	14	13	14	14	12	13	12	13	13	14	14	14	11	11	14	12	13	13	273
3.	Existence of requirements with respect to work time	13	11	14	10	14	10	13	13	10	10	8	8	9	12	10	10	14	11	14	14	12	240
4.	Additional infrastructure fees (parking, waste elimination, building administration, heating substation maintenance, etc.)	3	2	2	1	5	2	3	2	3	1	1	1	1	1	9	2	2	2	2	2	3	51
5.	Real estate fee	7	6	6	7	3	5	6	3	5	5	4	4	3	8	4	7	6	5	4	8	8	114
6.	Fees for common premises	12	9	9	11	12	7	12	9	11	14	12	12	10	10	9	9	12	13	11	9	7	220
7.	Method of calculation of rent	6	8	11	6	8	4	10	10	8	7	11	11	7	11	8	8	10	9	10	5	6	174
8.	Existence and amount of surety	5	10	4	8	6	11	11	5	6	11	3	5	4	4	6	3	4	7	7	6	4	130
9.	Additional conditions	9	14	10	12	7	9	8	6	12	13	10	10	13	13	11	12	13	12	13	11	5	222
10.	Price of heating and method of calculation	10	5	5	13	4	13	7	7	7	4	7	7	6	7	12	14	8	6	9	12	11	174
11.	Price of illumination and method of calculation	8	7	12	5	9	3	2	8	9	6	9	9	11	5	3	4	9	3	6	7	9	144
12.	Fees for joint advertising	2	3	7	4	2	6	5	4	1	3	5	3	5	2	5	5	3	4	3	3	2	77
13.	Property management fee	4	13	8	9	10	12	9	14	14	9	14	14	12	6	13	13	7	8	8	10	14	221
14.	Procedure of termination of the agreement	11	4	3	3	11	8	4	11	4	8	6	6	8	3	7	6	5	10	5	4	10	137

Table 3. Results of ranking of importance of premises lease indicators

No.	Name of indicator	Experts																					Total
1.	Year of construction of the building	21	26	17	16	16	11	25	27	12	27	24	11	4	4	18	16	12	25	20	22	19	373
2.	Elevator	23	14	22	13	11	10	17	13	20	10	20	20	21	27	7	18	13	6	23	21	16	339
3.	Aesthetic appearance of the building (exterior, interior)	4	6	5	12	12	15	16	11	17	11	17	25	1	1	3	5	15	11	14	1	9	201

(Continued)

No.	Name of indicator	Experts																					Total
(Continued)																							
4.	Fire safety system	17	23	9	24	20	24	22	10	21	9	18	5	11	11	17	19	10	14	13	20	10	327
5.	External and internal solutions of the building	13	5	21	5	8	16	14	22	3	25	19	18	17	17	15	21	16	13	12	27	13	320
6.	Degree of equipment of the building	1	16	10	17	1	3	15	26	6	19	3	6	24	5	5	6	3	7	6	19	8	205
7.	Level of engineering communications	16	2	14	7	7	19	13	9	11	15	16	17	9	9	14	23	4	10	5	17	7	244
8.	Functionality of premises	5	7	2	3	4	17	6	8	2	6	2	16	8	8	22	8	2	4	4	14	5	153
9.	Quality of illumination, heating and ventilation of premises	3	8	4	8	6	20	2	7	14	7	9	8	14	14	13	24	20	8	18	25	4	236
10.	Quality of interior finish	12	18	27	10	3	9	10	5	15	16	4	13	6	6	12	10	18	19	19	11	3	246
11.	Amount of natural light in the premises	19	9	13	19	26	25	7	3	10	2	14	10	20	20	10	13	19	3	24	6	24	296
12.	Materials used for the construction of the building	20	19	12	22	19	21	24	20	23	26	26	7	25	25	27	27	21	20	17	26	22	449
13.	Is the building certified	26	25	24	25	24	7	8	23	27	18	27	3	19	19	26	12	9	27	25	7	27	408
14.	Lessees of the building	10	21	20	27	27	13	20	21	16	24	22	27	22	22	16	2	27	18	13	3	13	391
15.	Lessor‘s view of the lessee	7	11	18	15	5	2	3	15	17	5	5	21	23	23	11	17	26	16	1	3	14	258
16.	Procedure of administration of the building	6	12	19	11	5	14	27	14	18	20	6	4	10	10	23	3	22	2	12	15	17	270
17.	Distinction and prestige of organizations located in the building	24	15	8	20	22	4	4	18	8	23	7	26	16	16	24	20	23	21	15	18	21	353
18.	Management of maintenance of the building	8	27	15	18	13	18	5	19	22	22	8	6	24	24	21	7	17	15	16	16	6	322
19.	Ownership type of the building	27	27	25	21	23	26	26	25	25	8	12	2	27	27	25	26	25	26	27	9	25	464
20.	Ability to place advertisements	22	4	16	14	17	27	21	17	19	13	23	23	15	15	19	14	11	17	22	4	15	348
21.	IT communications	11	3	7	9	10	12	19	16	13	4	21	22	12	12	4	15	5	2	21	10	12	240
22.	Possibility to choose the floor of the building	25	13	6	2	21	23	18	12	5	3	10	19	2	2	6	4	6	22	11	5	11	226
23.	Satisfaction of the needs of the lessee with respect to the premises	2	1	1	4	2	1	1	6	1	1	1	15	13	13	1	9	1	1	7	12	1	94
24.	Possibility to change parameters of premises	18	20	26	23	18	8	23	4	21	15	10	14	18	18	8	11	8	24	8	24	23	356
25.	Security of the building	15	17	11	1	15	22	12	6	1	14	25	1	7	7	9	25	14	10	9	23	8	255
26.	Easy access to the leased premises	14	10	3	6	14	5	9	2	4	12	11	12	3	3	2	22	7	5	9	2	2	157
27.	Percentage of occupation of the building	9	24	23	26	25	6	11	24	26	17	13	9	26	26	20	1	24	23	26	8	26	393

Table 4. Results of ranking of importance of environment indicators

No.	Name of indicator	Experts																					Total
1.	Pollution of the district	17	9	7	7	16	17	9	6	4	5	12	1	18	16	3	17	18	14	1	18	4	221
2.	Appearance of adjacent buildings and environment	6	8	9	5	10	13	10	14	13	3	11	3	9	4	1	9	15	7	13	2	13	185
3.	Distance to banks and other establishments	18	13	10	12	4	2	13	7	16	2	10	15	8	8	3	10	6	10	14	6	11	200
4.	Size of parking lot (number of spaces)	12	17	11	15	18	15	17	18	12	12	13	14	10	7	1	11	9	18	15	15	14	276
5.	Distance to residential neighbourhoods	13	18	3	17	17	18	12	17	18	7	18	4	13	6	18	15	17	16	17	14	12	292
6.	Distance to city centre	1	16	1	11	9	6	16	16	7	2	9	10	11	3	12	7	5	5	16	5	8	178
7.	Security of the neighbourhood	3	3	8	9	11	8	15	4	11	6	17	2	17	10	2	12	10	12	2	13	15	192
8.	View through the windows of the office	8	6	10	6	15	14	14	8	9	9	14	7	12	11	5	13	14	11	18	12	7	225
9.	Distance to restaurants, shopping, sport centres, etc.	7	12	2	8	6	3	11	3	17	7	15	8	16	13	3	8	3	15	12	11	3	185
10.	Traffic jams on the way to the office	9	14	6	3	2	4	3	5	5	5	16	9	14	12	5	16	16	6	7	16	9	184
11.	Size of parking lot	2	5	4	10	3	1	1	2	3	1	4	13	4	1	1	1	8	4	3	10	2	84
12.	Prestige of location and demand for location	4	1	12	8	5	7	2	1	1	1	3	18	5	2	1	2	4	2	8	17	5	110
13.	Distinction and prestige of organizations located in adjacent buildings	10	7	5	11	12	9	6	9	6	4	2	17	2	5	8	3	7	8	9	4	6	151
14.	Noisiness of environment of the building	16	4	15	17	13	10	7	10	10	8	8	5	15	17	9	14	13	13	4	9	17	236
15.	Visibility of the building	11	15	13	10	14	11	8	15	15	1	5	16	6	9	1	4	2	9	5	1	16	188
16.	Activity of the business environment	5	2	17	2	1	5	18	13	8	5	1	12	1	18	3	5	1	1	6	2	1	128
17.	Distance to parking lot	14	10	16	5	8	12	4	11	2	2	6	11	3	15	2	6	11	3	10	3	10	165
18.	Distance to a public transport stop	15	11	14	6	7	16	5	12	14	3	7	5	7	14	15	18	12	17	11	8	18	236

After ranking the importance of the blocks of indicators, the compatibility with the expert opinions was verified using the criterion χ^2. The results of these calculations are presented in Table 5.

Table 5. Results of the verification of the compatibility with expert assessments of the importance of the office lease indicators

No.	Name of block of indicators	Value of Pearson criterion χ^2	
		Calculated	Critical
1	Economic	192.90	23.68
2	Premises	86.13	31.45
3	Environment	79.54	27.59

It can be seen from Table 5 that in all three cases, the calculated value of criterion χ^2 is higher than the critical value, which means that the opinions of the experts are compatible.

After verifying the opinions of the experts with the ranks of all three blocks, we can determine the intervals of change of the random value X, as well as the number of indicators that are covered by such intervals. We will use the lowest and highest sum of the ranks in every block for this purpose (Table 6).

Table 6. Lowest and highest sums of the ranks for the commercial real estate (office) lease indicators

No.	Name of block of indicators	Lowest and highest sums of ranks of indicators	
		Lowest	Highest
1	Economic	27	273
2	Premises	90	432
3	Environment	84	292

Now we can determine the size of the intervals based on the formula:

$$h_i = \frac{S_{\max_i} - S_{\min_i}}{5}, \quad (1)$$

where: h_i – interval of the block of indicators i; $S_{\max_i}$ – highest sum of the ranks of the block of indicators i for all indicators of i; $S_{\min_i}$ – lowest sum of the ranks of the block of indicators i for all values of this block.

The rank change interval $S_{\max_i} - S_{\min_i}$ is divided into five parts, so that after finally combining all three blocks of indicators every interval will contain not less than 5 indicators.

Now the blocks of indicators can be grouped according to their intervals (Tables 7–9).

The results of the grouping of the indicators for all three blocks are presented in Table 10.

The elimination of insignificant indicators from the list is based on a histogram obtained by placing the values of the indicators at certain intervals and determining the frequency that those indicators were mentioned. Its configuration is thus also the theoretical probability distribution of the random value X, and its description largely depends on the manner of grouping of the results of the ranking of the indicators. In order to draw up a histogram, first of all we need to rank the indicators of all three blocks according to their importance, giving rank 1 to the most important indicator and rank n to the least important indicator (where n is the number of indicators in a block). The value X shows the number of times that the indicator was mentioned in the expert questionnaires ($0 \le X \le Z$, where Z is the number of experts).

Based on Tables 7–10, a histogram of the importance of the economic, premises and environment indicators can be drawn up (Figs. 2–4).

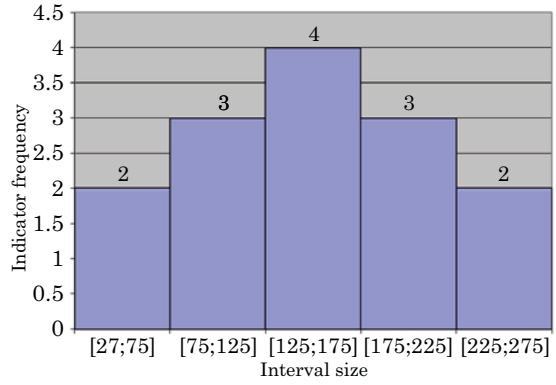

Fig. 2. Histogram of the distribution of the importance of the economic lease indicators

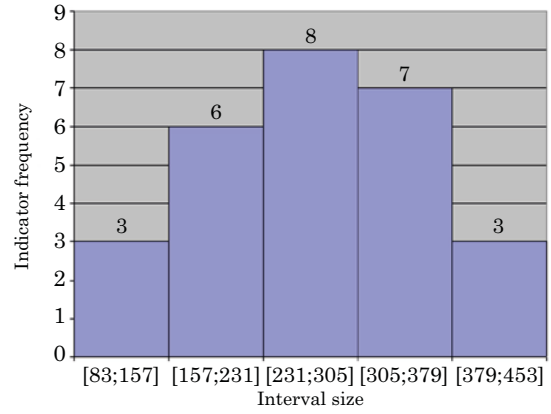

Fig. 3. Histogram of the importance of the premises indicators

Table 7. Results of the grouping of the economic lease indicators

Intervals	[27.75]	[75.125]	[125.175]	[175.225]	[225.275]
Frequency	2	3	4	3	2

Table 8. Results of the grouping of the premises indicators

Intervals	[83.157]	[157.231]	[231.305]	[305.379]	[379.453]
Frequency	3	6	8	7	3

Table 9. Results of the grouping of the environment indicators

Intervals	[82.124]	[124.166]	[166.208]	[208.250]	[250.292]
Frequency	2	3	7	3	2

Table 10. Results of the grouping of the lease indicators according to their importance

Name of block of indicators	Interval number										Total
	One		Two		Three		Four		Five		
	Interval limits	Frequency	Interval limits	Frequency	Interval limits	Frequency	Interval limits	Frequency	Interval limits	Frequency	
Economic	[27.75]	2	[75.125]	3	[125.175]	4	[175.225]	3	[225.275]	2	14
Premises	[83.157]	3	[157.231]	6	[231.305]	8	[305.379]	7	[379.453]	3	27
Environment	[82.124]	2	[124.166]	3	[166.208]	7	[208.250]	3	[250.292]	2	17

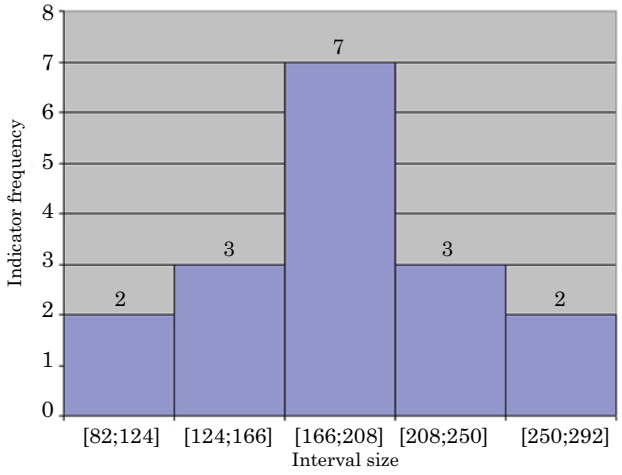

Fig. 4. Histogram of the importance of the environment indicators

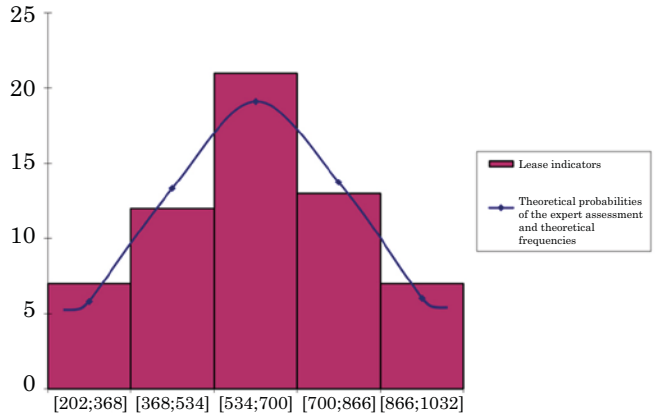

Fig. 5. Histogram of the expert assessments of the importance of the lease indicators and their theoretical distribution

Table 11. Collective results of the ranking of the importance of the lease indicators

Intervals	[202.368]	[368.543]	[543.700]	[700.866]	[866.1032]	Total
Frequency	7	12	19	13	7	58

Now we can draw up a collective histogram of the importance of the lease indicators. For this purpose, we need to start by determining the collective results of the ranking of the importance of the indicators, and then to determine the size of the intervals and the total number of indicators covered by the intervals based on the formula (1) (Table 11).

Based on Table 11, we can draw up a collective histogram of the importance of the lease indicators (Fig. 5).

As can be seen from Table 11, every interval contains at least 5 indicators. We can also see that a hypothesis that the random value X is distributed according to a normal distribution can be presented. Based on this table, we can calculate the parameters of the distribution – mean $\overline{X}$ and average square deviation S. From this, we determined that $\overline{X}$ = 619.6 and S = 196. Based on the table of the normal distribution, we calculated theoretical probability P_i that the random value X belongs to a certain interval (X_{i-1} , X_i), and the theoretical frequencies $n_i^* = np_i$. The results of the calculations are presented in Table 12.

Table 12. Theoretical probability and theoretical frequencies of the expert assessment of the importance of the lease indicators

Theoretical probability	0.1003	0.2297	0.3291	0.2371	0.1038
Theoretical frequencies	5.82	13.32	19.09	13.75	6.02

The theoretical frequencies of all lease indicators are presented in Figure 5. Now we need to verify whether the hypothesis that the importance of the commercial real estate object (office) lease is distributed according to a normal distribution is correct. For this purpose, we needed to calculate the actual and critical values of the criterion χ^2 with the degrees of freedom $\gamma = k - 3 - 1 = 2$ and the level of significance $\alpha = 0.05$. The results are $\chi_f^2 = 5.99$ and $\chi_{kr}^2 = 0.574$

The calculated value χ^2 is higher than the critical value; therefore, the hypothesis that the value X is distributed according to a normal distribution with the mean of X = 619.6 and the average square deviation S = 196 is accepted. This shows which indicators from the last intervals may be eliminated. For this purpose, we need to determine the percentage of unnecessary indicators to be eliminated. If we assume that this number is 10% (i.e. the level of significance $\alpha = 0.1$), then by applying the inequality $P(X_{kr} \le X \le +\infty) = 0.1$ from the normal distribution table, we can determine that X_{kr} = 870.48, i.e. the indicators whose sum of their ranks is higher than 870.48 should be eliminated from the general list of indicators. These are the indicators from the last interval (Fig. 5). They include 2 indicators from the economic block, 3 indicators from the premises block and 2 indicators from the environment block.

The final list of indicators to be included in the system for commercial real estate object (office) leasing is as follows (Table 13).

Table 13. System of indicators for commercial real estate object (office) leasing

No.	Blocks of lease indicators		
	Economic	Environment	Premises
1.	Rent	Appearance of adjacent buildings and environment	Year of construction of the building
2.	Period of lease	View through the windows of the office	Elevator
3.	Existence of requirements with respect to work time	Size of parking lot (number of spaces)	Aesthetic appearance of the building (exterior, interior)
4.	Additional infrastructure fees (parking, waste elimination, building administration, heating substation maintenance, etc.)	Prestige of location and demand for location	Fire safety system
5.	Real estate fee	Distinction and prestige of organizations located in adjacent buildings	External and internal architectural solutions of the building
6.	Fees for common premises	Noisiness of the environment of the building	Degree of equipment of the building
7.	Existence and amount of surety	Visibility of the building	Level of engineering communications
8.	Method of calculation of rent	Distance to parking lot	Functionality of premises
9.	Additional conditions	Distance to a public transport stop	Quality of illumination, heating and ventilation systems of the premises
10.	Price of heating and method of calculation	Pollution of the district	Quality of interior finish
11.	Price of illumination and method of calculation	Distance to banks and other state establishments	Amount of natural light in the premises
12.		Distance to city centre	Lessees of the building
13.		Safety of neighbourhood	Lessor's view of the lessee
14.		Distance to restaurants, shopping, sports centres, etc.	Procedure of administration of the building
15.		Traffic jams on the way to the office	Distinction and prestige of organizations located in adjacent buildings
16.		Efficiency of business environment	Procedure of maintenance of the building
17.			Possibility to place advertisements
18.			IT communications
19.			Possibility to choose the floor of the building
20.			Satisfaction of the needs of the lessee with respect to the premises
21.			Possibility to change parameters of premises
22.			Security of the building
23.			Easy access to the leased premises
24.			Percentage of occupation of the building

Table 13 shows the blocks of 11 economic lease indicators, 16 environment indicators and 24 premises indicators.

This system of indicators needs to be adapted for a multicriteria assessment. This necessity arises due to the fact that we need to know not only the values of the indicators, but also their weights. This is determined by the experts. The accuracy of an expert assessment largely depends on the number of assessed indicators. Where there are not many indicators, the experts can determine their weights quite accurately. However, when their number increases, it becomes more difficult to determine the interrelation of the weights of the indicators with respect to the analyzed phenomenon. This increases the incompatibility of the expert opinions. We can see without proof that an expert can assess the weights of 10–12 indicators

rather accurately (Ginevičius 2006). The system of indicators presented in Table 12 does not satisfy such conditions; thus, it should be transposed in a manner so that the number of assessed indicators does not exceed the desired number (Ginevičius 2007a, 2007b, 2009).

3. CONCLUSIONS

The adequacy of a multicriteria assessment largely depends on the system of indicators that reflects the analyzed phenomenon. It is formed on the basis of a list of indicators. The system of indicators should contain not too many and not too few indicators. Otherwise, the accuracy of the multicriteria assessment will decrease.

Based on the literature and other sources, a list of 59 indicators for commercial real estate object (office) leasing was compiled. In order to form an accurate system of indicators for leasing, the insignificant indicators had to be eliminated. This was done by applying the methods of mathematical statistics.

The formation of the system of lease indicators was based on the table specifying the names of the indicators, as well as on the frequency that each indicator was mentioned. The elimination of indicators from the list was then done in the following order: the value X was chosen as being similar to the distribution of the frequencies in the table; the interval of change of this value was determined; a histogram of the value X was drawn up; depending on the form of the histogram a theoretical probability distribution was chosen; the parameters of the chosen probability distribution were then calculated (with mean and average square deviations); based on these parameters, the function of the probability distribution $F(x)$ or the density $f(x)$ was determined; the calculation of the theoretical probability P_i that the random value X belongs to any interval (X_{i-1}, X_i) was performed: i.e. the calculation of the respective theoretical frequencies; the statistical hypothesis that the random value X was distributed according to the respective theoretical distribution was verified; and depending on the chosen degree of significance we determined the indicators that needed to be eliminated, as they were insignificant. It was determined that 2 indicators from the economic block, 3 indicators from the premises block and 2 indicators from the environment block could be eliminated from the general list of lease indicators as insignificant.

The theoretical benefit of this article is the suggestion of an adequate method for the formation of the system of indicators for commercial real estate object (office) leasing that is intended to solve the problem of office leasing. The method allows businessmen to more accurately assess the office leasing options which are the most suitable.

Even though the current study has presented several advantages, there are some limitations as well. The indicators need to be determined by means of an expert evaluation, which introduces a certain element of subjectivity.

REFERENCES

Au-Yong, C. P.; Ali, A. S.; Ahmed, F. 2014. Improving occupants'satisfaction with effective maintenance management of HVAC system in office buildings, *Automation in Construction* 43: 31–37. http://dx.doi.org/10.1016/j.autcon.2014.03.013

Azbainis, V.; Rudzkiene, V. 2011. Evaluation of impact of transition and economic crises of real estate market, *Business: Theory and Practice* 12(2): 150–161. http://dx.doi.org/10.3846/btp.2013.20

Ball, M.; Lizieri, C.; McGregor, B. 2012. *The economics of commercial property markets*. Routledge.

Bausys, R.; Zavadskas, E. K. 2015. Multicriteria decision making approach by VIKOR under interval neutrosophic set environment, *Economic Computation and Economic Cybernetics Studies and Research* 49(4): 33–48.

Boggia, A.; Cortina, C. 2010. Measuring suitainable development using a multicriteria model: a case study, *Journal of Environmental Management* 91(11): 2301–2306. http://dx.doi.org/10.1016/j.jenvman.2010.06.009

Brauers, W. K. M.; Ginevičius, R.; Podviezko, A. 2014. Development of a methodology of evaluation of financial stability of commercial banks, *Panoeconomics* LXI(3): 344–367. http://dx.doi.org/10.2298/PAN1403349B

Buracas, A.; Zvirblis, A.; Joksiene, I. 2012. Measurement of entrepreneurship macro surrounding advantages: country's economic competitiveness approach, *Inzinerine Ekonomika–Engineering Economics* 23(1): 5–13. http://dx.doi.org/10.5755/j01.ee.23.1.1219

Čeh, M.; Viitanen, K.; Peruš, I. 2012. A non-parametric CAE approach to office rents: identification of Helsinki metropolitan area submarkets, *Expert Systems with Applications* 39(1): 460–471. http://dx.doi.org/10.1016/j.eswa.2011.07.037

French, N.; Wiseman, G. 2003. The price of space: the convergence of value in use and value in exchange, *Journal of Property Investment & Finance* 21(1): 23–30. http://dx.doi.org/10.1108/14635780310468284

Ginevičius, R. 2006. Multicriteria evaluations of the criteria weights based on their interrelationship, *Business: Theory and Practice* 7(1): 3–13. http://dx.doi.org/10.3846/btp.2006.01

Ginevičius, R. 2007a. Hierarchical structuring of processes and phenomena, *Business: Theory and Practice* 8(1): 14–18.

Ginevičius, R. 2007b. Generating a structured system of cryteria for describing a complicated phenomenon, *Business: Theory and Practice* 8(2): 68–72.

Ginevičius, R. 2009. Some problems of quantitative evaluations of the state of social – economic systems, *Business: Theory and Practice* 10(2): 69–83. http://dx.doi.org/10.3846/1648–0627.2009.10.69–83

Ginevičius, R.; Podvezko, V. 2005. Generations of a set of evaluations criteria, *Business: Theory and Practice* 4: 199–207.

Ginevičius, R.; Podvezko, V.; Podvezko, A.; Ginevičius, T. 2013. On creating a system of criteria for multiple criteria evaluations using methods of matematical statistics, in *14th German – Lithuanian – Polish Colloquium*, 15 May 2013, Vilnius, Lithuania. Vilnius: Technika, 64–71.

Ginevičius, R.; Podviezko, A. 2013. The evaluation of financial stability and soundness of Lithuanian banks, *Ekonomska Istrazivanja–Economic Research* 26(2): 191–208.

Golusin, M.; Munitlak Ivanović, O. 2009. Definition, characteristics and state of suitainable development in countries of Southeastern Europe, *Agriculture, Ecosystems and Environment* 130(1–2): 67–74. http://dx.doi.org/10.1016/j.agee.2008.11.018

Hashemkhani Zolfani, S.; Maknoon, R.; Zavadskas, E. K. 2016. An introduction to prospective multiple attribute decision making (PMADM), *Technological and Economic Development of Economy* 22(2): 309–326. http://dx.doi.org/10.3846/20294913.2016.1150363

Joksiene, I.; Zvirblis, A. 2014. Consolidated assessment of composite competitiveness indicators: the case of manufacturing enterprise, in *8th International Scientific Conference "Business and Management 2014"*, 15–16 May 2014, Vilnius, Lithuania. Vilnius: Technika, 59–66. http://dx.doi.org/10.3846/bm.2014.009

Keshavarz Ghorabaee, M.; Zavadskas, E. K.; Olfat, L.; Turskis, Z. 2015. Multi-criteria inventory classification using a new method of evaluation based on distance from average solution (EDAS), *Informatica* 26(3): 435–451. http://dx.doi.org/10.15388/Informatica.2015.57

Kim, Y.; Park, D.; Um, M.-J.; Lee, H. 2015. Prioritizing alternatives in strategic environmental assessment (SEA) using VIKOR method with random sampling for data gaps, *Expert Systems with Applications* 42(22): 8550–8556. http://dx.doi.org/10.1016/j.eswa.2015.07.010

Kondyli, J. 2010. Measurement and evaluation of suitainable development: a composite indicator for the Islands of the North Aegean region, Greece, *Environmental Impact Assessment Review* 30(6): 347–356. http://dx.doi.org/10.1016/j.eiar.2009.08.006

Kou, G.; Ergu, D.; Lin, C.; Chen, Y. 2016. Pairwise comparison matrix in multiple criteria decision making, *Technological and Economic Development of Economy* 22(5): 738–765. http://dx.doi.org/10.3846/20294913.2016.1210694

Liu, Y.; Fan, Z.-P.; Zhang, X. 2016. A method for large group decision-making based on evaluation information provided by participators from multiple groups, *Information Fusion* 29: 132–141. http://dx.doi.org/10.1016/j.inffus.2015.08.002

Mardani, A.; Jusoh, A.; Nor, K. M. D.; Khalifah, Z.; Zakwan, N.; Valipous, A. 2015a. Multiple criteria decision-making techniques and their applications – a review of the literature from 2000 to 2014, *Ekonomska Istrazivanja–Economic Research* 28(1): 516–571. http://dx.doi.org/10.1080/1331677X.2015.1075139

Mardani, A.; Jusoh, A.; Zavadskas, E. K.; Khalifah, Z.; Nor, K. M. 2015b. Application of multiple-criteria decision-making techniques and approaches to evaluating of service quality: a systematic review of the literature, *Journal of Business Economics and Management* 16(5): 1034–1068. http://dx.doi.org/10.3846/16111699.2015.1095233

Nase, I.; Berry, J.; Adair, A. 2013. Real estate value and quality in commercial office properties, *Journal of European Real Estate Research* 6(1): 48–62. http://dx.doi.org/10.1108/17539261311312988

Nugaras, J.; Ginevičius, R. 2015. The strategic assessment of networking of a higher educational institutions, *Ekonomska Istrazivanja–Economic Research* 28(1): 31–44. http://dx.doi.org/10.1080/1331677X.2014.995963

Pagourtzi, E.; Assimakopoulos, V.; Hatzichristos, T.; French, N. 2003. Real estate appraisal: a review of valuation methods, *Journal of Property Investment & Finance* 21(4): 383–401. http://dx.doi.org/10.1108/14635780310483656

Podvezko, V. 2008. Comprehensive evaluation of complex quantities, *Business: Theory and Practice* 9(3): 160–168. http://dx.doi.org/10.3846/1648–0627.2008.9.160–168

Russell, S. 2002. *The dynamics of property location–value and the factors which drive the location of shops, offices and other land uses*. London: Taylor & Francis.

Turskis, Z.; Zavadskas, E. K.; Peldschus, F. 2009. Multi-criteria optimization systems for decision making in construction design and management, *Inzinerine Ekonomika–Engineering Economics* 61(1): 7–18.

Zavadskas, E. K.; Turskis, Z. 2011. Multiple criteria decision making (MCDM) methods in economics: an overview, *Technological and Economic Development of Economy* 17(2): 397–427. http://dx.doi.org/10.3846/20294913.2011.593291