MULTICRITERION ANALYSIS METHODS IN EVALUATION OF PENSION FUNDS

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Abstract. *This article describes the task of multicriteria analysis of pension funds of Latvian republic, determines the main features of this task and gives grounds for the feasibility of using Multi-criteria decision analysis (MCDA) and taxonometric method. Is conducted review of the fields of using Multi-criteria decision analysis in business. Multi-criteria analysis of pension funds is conducted by using criteria, employed in creating rating funds based only on public information. G23*

Keywords: *multi-criteria analysis, taxonometric method, pension funds, Latvia.*

Introduction

Latvian state renders service (social insurance) worth almost 1/3of salary and which cannot be refused of, but getting this insurance service in the future is not guaranteed. Complex situation with social security budget in Latvia in 2011 when spending part exceeds income share forces the government to spend social budget savings. If the situation does not improve and there are no government decisions in this field in 2012 may be used up the last lat out of reserve. In this case the problem of securing their retirement years is becoming topical. In Latvia since 1998 there have existed three level pension schemes. The third level – private voluntary pension scheme is already working. The aim of this scheme is by using mediation of private pension fund contribute member funds and save additional capital for retirement. The typical feature of this scheme is only voluntary membership. Latvia has two private pension funds – open and closed. At present private pension funds offer the following contribution strategies – conservative and dynamic. Conservative contribution strategy is more secure but it brings less profit. In its turn dynamic contribution strategy is risky but it is possible to save more. In year 2009 the share of private pension fund members accounted for 16.3% of Latvian economically active residents. Under current crisis circumstances consumers of financial services face the crucial problem of financial partner stability and while choosing this partner should take into account many factors. Lack of reliability of rendered service of state insurance may cause residents to consider the opportunity of getting additional services and then Latvian residents may find it urgent to choose a pension fund as a partner in providing their pension funds.

In the process of decision making about pension fund the client should take into account a number of factors: positive business reputation activities without losses, financial stability, and investment potential. This choice of partner may be carried out by using methods of multi-criteria analysis. Object of research is decision making about the choice of pension fund in Latvian republic. The subject of research is application of the method of multi-criteria assessment by using expert examination and taxonometric method. The research is carried out on the basis of actual data Latvian pension funds for year 2009.

1. Characteristics of practical application of multiple criteria decision making (MCDM) in business

Multi-criteria assessment in decision-making in economic-financial field and rating assessment of economic subjects is intensely used. According to the data of conducted bibliometric investigation about multiple criteria decision making (MCDM) and multiatribute utility theory (MAUT) using the ISI database over the 5-year period (2002-2006) the authors of research, notice the increase of number of MCGM/MAUT publications along with the growth of management science/operations research publications (MS/OR). The authors of bibliometric investigation[1] notice the reduction of relative share OR/MC and management and business

[1] Wallenius, J.; et al. Multiple Criteria Decision Making, Multiattribute Utility Theory: Recent Accomplishments and What Lies Ahead. *Management Science*, Vol.54, No 7, 2008. p. 1336-1349.

topics about 40%, however, share of computer science has increased by some 20%, environment has doubled, but all engineering areas have increased too.

The method of analysis of hierarchies is interdisciplinary field of science. In Latvia there is a lot of research in the field of information fusion in decision making under uncertainty (Borisovs, Vališevskis[2], Valisevskis[3]) and there are practical examples of using this method in different spheres of business. The author conducted bibliometric research of publications, fulfilled on a given theme in Latvia. The range of research is relatively wide: from using analytic hierarchy process (AH) in giving foundations of the choice suitable for freezing raspberries, black and red currant berries (Kampuse[4]), in developing information system of tourist routes choice (Romanov[5]) and rating of insurance companies reliability (Voronova[6], Voronova, Pettere[7]) to applying AH in solving the problems of national security (Melderi[8]).

The practical approach in using Multi-criteria decision analysis (MCDA (AH)) is obvious in the works of Lithuanian researchers. Thus, the application of multiple-criteria analysis for complex assessment of factors of new construction companies marketing environment (Žvirblis e*t al.*[9]), the usage of Promethee method Evaluating Lithuanian Banks from perspective of their reliability to customers (Ginevičius e*t al.*[10]) and the option of investing in real estate investment (Ginevičius e*t al.*[11]). Use of Analytic Hierarchy Process (AHP) and ELECTRE (Elimination Et Choix Treduisantë La Realite) for determining weighting ratios of factors criteria for assessing the efficiency of investment projects of business subjects claiming to get investment support of the EC by using the techniques of DEA is investigated by Laurinavičius E. *et al*. [12].

2. Solution of the task of choosing a pension fund by using Multi-criteria decision analysis (MCDA)

Assessment of the choice of pension fund is carried out by persons having a similar goal (provide their own pension in the future), but differing in their approach to assessment of investment potential. Choice of pension fund is carried out by using system of assessment criteria. System of assessment criteria selection is based on creating ratings of pension funds and possibility of getting public information about funds activities. In this case assessment is conducted by means of criteria which are grouped into 4 criteria groups (fig. 1). Determining selection criteria for the choice of pension funds the author took into account impossibility of applying merely financial ratios while conducting analysis of preference related to the activities of pension funds due to specific procedures of preparing financial statements of funds. Two–level system of criteria is connected with the fact, that if we use a great number of criteria (over 10) the meaningfulness of separate criteria in expert examination is lost. Assessment of pension funds is carried out by using Analytic Hierarchy Process (AH) and consists of structuring alternatives P on criteria of cluster G. Then let us form matrix of paired comparisons for each level of hierarchy, elements of which are assessments of comparative importance of elements of a given level of hierarchy related directly to above standing element. Assessment of importance is carried out by means of comparing elements of a matrix column with a line element assessment

[2] Borisov A., Vališevskis A. Information Fusion in Decision Making under Uncertainty // Proceedings of ICAFS-2008, Eighth International Conference on Application of Fuzzy Systems and Soft Computing ICAFS-2008, SOMIJA, Helsinki, 1-3 Septembers, 2008, p. 261-270.

[3] Vališevskis, A. Decision making the probabilistic uncertainty and fuzzy situations. Summary of the Promotion work. Riga: RTU, 2006.

[4] Kampuse, S. Suitability to Freezing of Berries from Different Raspberry, Black, Red and White Currant Cultivars Grown in Latvia. Summary of Promotion work. Jelgava: LLU, 2006.

[5] Romanovs, A. Application of Multi-criteria analysis methods to the tourist information system development. Summary of the Promotion work. Riga: Transport and telecommunication institute, 2006.

[6] Voronova, I. Technique of Insurance companies' reliability assessment. *Journal of Business, Management and Education.* 2011. 9(1).

[7] Voronova, I.; Pettere, G. Rating as an Assessment Instrument of the Insurance Market participants Security. In: 49th International Scientific Conference of Riga technical University. The problems of development of national economy and entrepreneurship": RTU Scientific Conference of Economics and Entrepreneurship (SCEE'2008)

[8] Melderi, J. Grounds for decision-making process of multi-criteria risk-based analysis, addressing security issues]. AZPC-2/01-2009. Riga: AZPCIS, 2009

[9] Žvirblis, A.; Krutkienė, I.; Vitkunas, R. Multiple-Criteria Assessment of the Macro Environment of New Construction Companies of the Baltic States. *Issues of Business and Law* [interactive]. Volume 1, 2009.

[10] Ginevičius, R. Evaluating Lithuanian Banks from perspective of their reliability to customers by Promethee method. Vilnius, Lithuania. Business and Management 2010. Selected Paper, 993-999.

[11] Ginevičius, R. Zubrecovas, V. Selection of Optimal Real Estate Investment Project Basing of Multiple Criteria Evaluation Using Stochastic Dimensions. *Jornal of Business Economics and Management.* 10(3):261-270.

[12] Laurinavičius Evaluation of the efficiency of the projects. Management theory and studies for rural business and infrastructure development. Nr.17 (2).

of criteria and advantages of alternative a_{ij} (pension fund, P_i) before alternative P_j, is determined on nine point Saaty's linear scale: 1 - if this advantage is not available; 3 - if advantage is weak; 5 –if advantage is substantial; 7- if advantage is evident; 9- if advantage is absolute; 2,4,6,8 – interim comparative assessments. General algorithm by doing calculations fulfilled in Excel is given on fig.1. Ratios of relative importance of criteria are determined by calculating main own vectors conforming to main or maximum own meaning of matrix of comparisons with consequent standardization of this vector. For matrix A (Table 1) we get weights of criteria: $\alpha_1 = 0.2739$, $\alpha_2 = 0.0597$, $\alpha_3 = 0.5537$, $\alpha_4 = 0.1127$ and of sub criteria account for $\alpha_{21} = 0.162$, $\alpha_{22} = 0.313$, $\alpha_{23} = 0.394$, $\alpha_{24} = 0.131$; $\alpha_{31} = 0.163$, $\alpha_{32} = 0.235$, $\alpha_{33} = 0.602$; $\alpha_{41} = 0.038$, $\alpha_{42} = 0.456$, $\alpha_{43} = 0.242$, $\alpha_{45} = 0.169$.

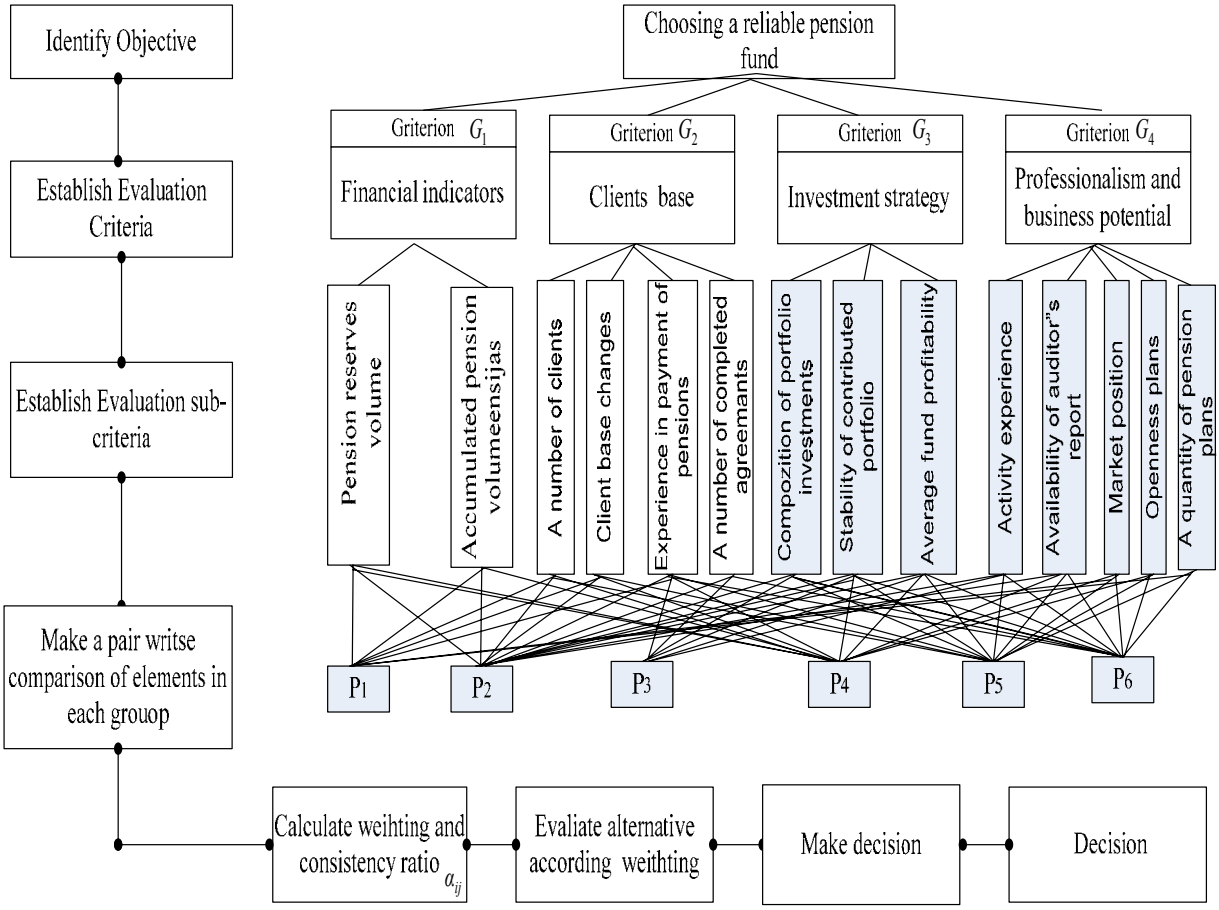

Figure 1. Hierarchical scheme of selection of secure pension fund

Thus, by making decision the most important is a group of criteria characterizing investment strategy (criterion 3) and financial results (criterion 1). The level of assessmentt of alternatives (pension funds) is found by using the method of belonging based on paired comparisons[13].

Table 1. Matrix A of comparing the importance of criteria

Choice of pension plan	Financial indicators	Clients base	Investment strategy	Professionalism and business potential
Financial indicators	1	6	1/4	5
Clients base	1/6	1	1/5	1/4
Investment strategy	4	5	1	7
Professionalism and business potential	1/5	4	1/7	1

[13] Borisov, F.N.; Krumberg,O.F.; Fedorov, I.P. Decision-making based on fuzzy models: examples of use. Riga: Zinatne,1990.

For each pair of alternatives by criterion $G_j(i=1,n)$ is assessed the advantage of one variant over another by using quantative and qualitative information. Table 2 shows a fragment of expert statements, summed up in matrix of paired comparisons. In each matrix 15 elements correspond to paired comparisons. The rest elements are found with a view to the fact that matrix of paired comparisons is diagonal and reverse symmetric.

Table 2. Paired comparisons of alternatives (fragment) on the Saaty's linear scale

Sub criteria	Paired comparisons
$\widetilde{G}_{11}$	Advantage P_1 over P_2 is absent. Advantage P_1 over P_3 is absent. Considerable advantage P_1 over P_4. Considerable advantage P_1 over P_5. Substantial advantage of P_1 over P_6. Weak advantage of P_2 over P_3. Absolute advantage P_2 over P_4. Considerable advantage P_2 over P_5. Considerable advantage P_2 over P_6. Absolute advantage of P_3 over P_4. Considerable advantage P_3 over P_5. Considerable advantage P_3 over P_6. Advantage P_4 over P_5 is absent. Advantage P_4 over P_6 is absent. Advantage P_5 over P_6 is absent.
$\widetilde{G}_{12}$	Substantial advantage P_1 over P_2. Substantial advantage P_1 over P_3. Absolute advantage P_1 over P_4. Absolute advantage P_1 over P_5. Weak advantage P_1 over P_6. Considerable advantage P_2 over P_3. Considerable advantage P_2 over P_4. Considerable advantage P_2 over P_5. Weak advantage P_2 over P_6. Absolute advantage P_3 over P_4. Considerable advantage P_3 over P_5. Weak advantage of P_3 over P_6 is absent. Advantage P_4 over P_5 is absent. Weak advantage of P_4 over P_6 is absent. Weak advantage of P_5 over P_6 is absent.

We get weights of sub criteria:

$$\widetilde{G}_{31}=\left\{\frac{0.368}{P_1},\frac{0.057}{P_2},\frac{0.057}{P_3},\frac{0.087}{P_4},\frac{0.087}{P_5},\frac{0.344}{P_4}\right\},\widetilde{G}_{24}=\left\{\frac{0.061}{P_1},\frac{0.061}{P_2},\frac{0.241}{P_3},\frac{0.513}{P_4},\frac{0.062}{P_5},\frac{0.062}{P_4}\right\}$$

$$\widetilde{G}_{33}=\left\{\frac{0.150}{P_1},\frac{0.512}{P_2},\frac{0.098}{P_3},\frac{0.160}{P_4},\frac{0.032}{P_5},\frac{0.048}{P_4}\right\},\widetilde{G}_{41}=\left\{\frac{0.068}{P_1},\frac{0.177}{P_2},\frac{0.260}{P_3},\frac{0.260}{P_4},\frac{0.048}{P_5},\frac{0.187}{P_4}\right\};$$

$$\widetilde{G}_{42}=\left\{\frac{0.167}{P_1},\frac{0.167}{P_2},\frac{0.167}{P_3},\frac{0.166}{P_4},\frac{0.166}{P_5},\frac{0.167}{P_4}\right\},\widetilde{G}_{43}=\left\{\frac{0.458}{P_1},\frac{0.098}{P_2},\frac{0.142}{P_3},\frac{0.026}{P_4},\frac{0.022}{P_5},\frac{0.254}{P_4}\right\};$$

$$\widetilde{G}_{11}=\left\{\frac{0.203}{P_1},\frac{0.388}{P_2},\frac{0,282}{P_3},\frac{0.027}{P_4},\frac{0.037}{P_5},\frac{0.063}{P_4}\right\},\widetilde{G}_{12}=\left\{\frac{0.457}{P_1},\frac{0.131}{P_2},\frac{0.111}{P_3},\frac{0.027}{P_4},\frac{0.027}{P_5},\frac{0.247}{P_4}\right\};$$

$$\widetilde{G}_{21}=\left\{\frac{0.441}{P_1},\frac{0.201}{P_2},\frac{0.202}{P_3},\frac{0.060}{P_4},\frac{0.053}{P_5},\frac{0.042}{P_4}\right\},\ \widetilde{G}_{22}=\left\{\frac{0.197}{P_1},\frac{0.469}{P_2},\frac{0.03}{P_3},\frac{0.091}{P_4},\frac{0.152}{P_5},\frac{0.061}{P_4}\right\};$$

$$\widetilde{G}_{23}=\left\{\frac{0.449}{P_1},\frac{0.084}{P_2},\frac{0.187}{P_3},\frac{0.022}{P_4},\frac{0.046}{P_5},\frac{0.212}{P_4}\right\},\widetilde{G}_{24}=\left\{\frac{0.281}{P_1},\frac{0.071}{P_2},\frac{0.318}{P_3},\frac{0.020}{P_4},\frac{0.022}{P_5},\frac{0.290}{P_4}\right\}(1)$$

From (1) it follows that there is no alternative (pension fund) dominating in all criteria, that is why the decision will depend on the importance of these very criteria and subcriteria. Taking into account the importance of subcriteria we get the following results:

$$\widetilde{G}_{11}^{0.833}=\left\{\frac{0.169}{P_1},\frac{0.324}{P_2},\frac{0,235}{P_3},\frac{0.023}{P_4},\frac{0.031}{P_5},\frac{0.052}{P_6}\right\};\widetilde{G}_{12}^{0.167}=\left\{\frac{0.076}{P_1},\frac{0.022}{P_2},\frac{0.018}{P_3},\frac{0.005}{P_4},\frac{0.004}{P_5},\frac{0.041}{P_6}\right\};$$

$$\widetilde{G}_{21}^{0.162}=\left\{\frac{0.071}{P_1},\frac{0.033}{P_2},\frac{0.033}{P_3},\frac{0.01}{P_4},\frac{0.008}{P_5},\frac{0.070}{P_6}\right\},\widetilde{G}_{22}^{0.313}=\left\{\frac{0.177}{P_1},\frac{0.033}{P_2},\frac{0.074}{P_3},\frac{0.009}{P_4},\frac{0.018}{P_5},\frac{0.084}{P_6}\right\};$$

$$\widetilde{G}_{23}^{0.394}=\left\{\frac{0.177}{P_1},\frac{0.033}{P_2},\frac{0.074}{P_3},\frac{0.009}{P_4},\frac{0.018}{P_5},\frac{0.084}{P_6}\right\},\widetilde{G}_{24}^{0.131}=\left\{\frac{0.037}{P_1},\frac{0.009}{P_2},\frac{0.042}{P_3},\frac{0.003}{P_4},\frac{0.003}{P_5},\frac{0.038}{P_6}\right\};$$

$$\widetilde{G}_{31}^{0.163}=\left\{\frac{0.003}{P_1},\frac{0.007}{P_2},\frac{0.01}{P_3},\frac{0.010}{P_4},\frac{0.002}{P_5},\frac{0.007}{P_6}\right\},\widetilde{G}_{32}^{0.235}=\left\{\frac{0.076}{P_1},\frac{0.076}{P_2},\frac{0.076}{P_3},\frac{0.076}{P_4},\frac{0.076}{P_5},\frac{0.076}{P_6}\right\};$$

$$\widetilde{G}_{33}^{0.602}=\left\{\frac{0.150}{P_1},\frac{0.512}{P_2},\frac{0.098}{P_3},\frac{0.160}{P_4},\frac{0.032}{P_5},\frac{0.048}{P_6}\right\},\widetilde{G}_{41}^{0.038}=\left\{\frac{0.003}{P_1},\frac{0.007}{P_2},\frac{0.010}{P_3},\frac{0.010}{P_4},\frac{0.002}{P_5},\frac{0.007}{P_6}\right\};$$

$$\widetilde{G}_{42}^{0.456}=\left\{\frac{0.076}{P_1},\frac{0.076}{P_2},\frac{0.076}{P_3},\frac{0.076}{P_4},\frac{0.076}{P_5},\frac{0.076}{P_6}\right\},\widetilde{G}_{43}^{0.242}=\left\{\frac{0.110}{P_1},\frac{0.023}{P_2},\frac{0.034}{P_3},\frac{0.006}{P_4},\frac{0.005}{P_5},\frac{0.061}{P_6}\right\};$$

$$\widetilde{G}_{44}^{0.095}=\left\{\frac{0.013}{P_1},\frac{0.013}{P_2},\frac{0.013}{P_3},\frac{0.013}{P_4},\frac{0.031}{P_5},\frac{0.012}{P_6}\right\};\widetilde{G}_{45}^{0.169}=\left\{\frac{0.019}{P_1},\frac{0.050}{P_2},\frac{0.043}{P_3},\frac{0.038}{P_4},\frac{0.010}{P_5},\frac{0.008}{P_6}\right\}.$$

Do summing up of the results taking into account the importance of criteria:

$$G_1^{0.2739}=\left\{\frac{0.245}{P_1},\frac{0.345}{P_2},\frac{0.253}{P_3},\frac{0.027}{P_4},\frac{0.036}{P_5},\frac{0.093}{P_6}\right\};G_2^{0.0597}=\left\{\frac{0.336}{P_1},\frac{0.274}{P_2},\frac{0.120}{P_3},\frac{0.059}{P_4},\frac{0.094}{P_5},\frac{0.118}{P_6}\right\};$$

$$G_3^{0.5537}=\left\{\frac{0.164}{P_1},\frac{0.332}{P_2},\frac{0.125}{P_3},\frac{0.231}{P_4},\frac{0.048}{P_5},\frac{0.100}{P_6}\right\};G_4^{0.1127}=\left\{\frac{0.222}{P_1},\frac{0.167}{P_2},\frac{0.176}{P_3},\frac{0.143}{P_4},\frac{0.125}{P_5},\frac{0.164}{P_6}\right\}.$$

Fuzzy indicating how fully alternatives (pension funds) P_1 , $P_2 \ldots P_6$ *meet criteria* G_1, G_2, G_3 *and* G_4 :

$$P_1=\left\{\frac{0.245}{G_1},\frac{0.336}{G_2},\frac{0.165}{G_3},\frac{0.222}{G_4}\right\},P_2=\left\{\frac{0.345}{G_1},\frac{0.274}{G_2},\frac{0.332}{G_3},\frac{0.170}{G_4}\right\},$$

$$P_3=\left\{\frac{0.253}{G_1},\frac{0.120}{G_2},\frac{0.125}{G_3},\frac{0.176}{G_4}\right\},P_4=\left\{\frac{0.027}{G_1},\frac{0.059}{G_2},\frac{0.231}{G_3},\frac{0.143}{G_4}\right\}, \quad (2)$$

$$P_5=\left\{\frac{0.036}{G_1},\frac{0.094}{G_2},\frac{0.048}{G_3},\frac{0.125}{G_4}\right\},P_6=\left\{\frac{0.093}{G_1},\frac{0.118}{G_2},\frac{0.100}{G_3},\frac{0.164}{G_4}\right\}.$$

Graphs of functions indicating belonging of alternatives are shown in Fig.2. According to priority criterion G_3 (investment strategy) the most preferable is pension fund P_2 , as for the second priority criterion G_1 (financial results) the most preferable is also pension fund P_2 . Taking into account multicriteria assessment it is possible to formulate a number of preferences:

$$\begin{array}{ccccccccccc} P_2 & > & P_1 & > & P_3 & > & P_6 & > & P_4 & > & P_5 \\ (1.121) & & (0.967) & & (0.674) & & (0.475) & & (0.460) & & (0.303) \end{array} \quad (3)$$

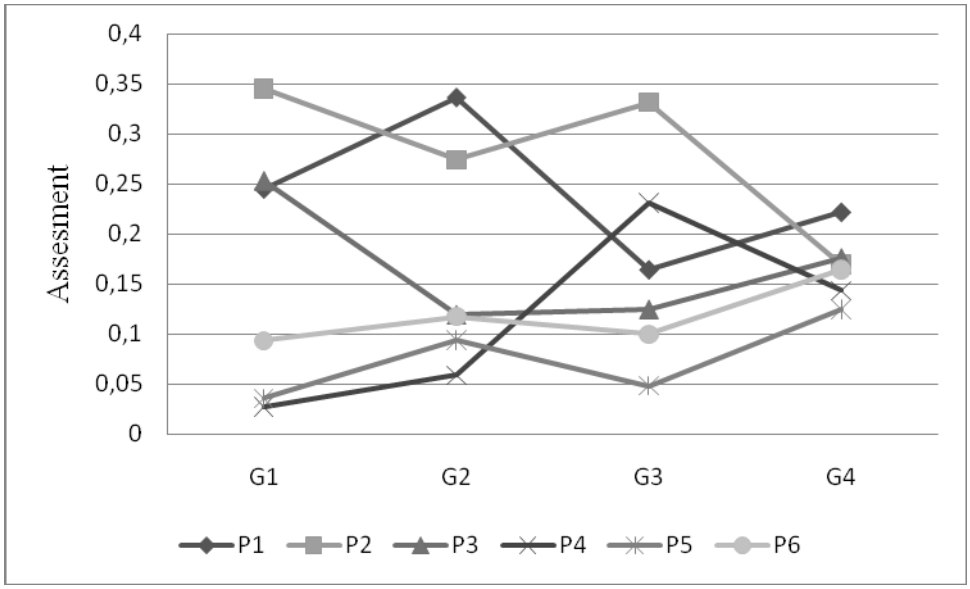

Fig.2. Comparison of pension funds with a view to the importance of creteria G_1, G_2, G_3 and G_4

3. Solution of the task of pension fund choice by using a taxonometric method

Pension funds assessment may be fulfilled by using absolute meanings of criteria which can be formed on the basis of public information. If there is such an opportunity, but indicators have different unit of measurement it is recommended to do the standardization of indicators[14] transformation of matrix X into matrix Z is carried out:

$$Z_{ij} = \frac{x_{ij} - \bar{x}_j}{\sigma_j}, \qquad (4)$$

Where $\bar{x}_j$ – all j indicators level arithmetic mean;

σ_j – j indicator deviation.

$$\bar{x}_j = \frac{1}{m}\sum_{i=1}^{m} x_{ij} \qquad (5)$$

$$\sigma_j = \sqrt{\frac{1}{m}\sum_{i=1}^{m}(x_{ij} - \bar{x}_j)^2} \qquad (6)$$

Carried out indicators standardization is affected by indicators absolute value and variations. The next stage is determination of standard indicator (Z_i^s). In order to determine it one should select in every row the largest or smallest indicator value depending on its optimal volume. Distance R_{ij} is calculated by using a formula (7):

$$R_{ij} = \sum_{j=1}^{n}(Z_{ij} - \bar{x}_j)^2 \qquad (7)$$

The best alternative choice is made by using the smallest square method. The alternative which has minimum R_{ij} is considered to have the best value (Tab. 3).

[14] Voronova, I.; Pettere, G. Rating as an Assessment Instrument of the Insurance Market participants Security. Riga: RTU Publishing House, 2009, p. 163–165

Table 3. Assessment of alternatives by using a taxonometric method

Criteria	Sub criteria	Pension fund					
		P_1	P_2	P_3	P_4	P_5	P_6
G_1	$\widetilde{G}_{11}$	0	6.10440	5.22616	6.70682	6.63231	4.55987
	$\widetilde{G}_{12}$	0	3.38362	1.63703	5.58798	5.57547	0.16695
G_2	$\widetilde{G}_{21}$	0	1.05365	0.35711	5.71650	5.56872	3.97862
	$\widetilde{G}_{22}$	2.95093	0	1.27655	5.97100	5.82384	6.50544
	$\widetilde{G}_{23}$	0	4.23432	2.02799	7.07027	7.09288	2.12322
	$\widetilde{G}_{24}$	0.07193	0.01347	6.43995	0.00114	0	0.00585
G_3	$\widetilde{G}_{31}$	0	4.61538	4.61538	2.59615	2.59615	0
	$\widetilde{G}_{32}$	4.75248	4.75248	0.29703	0	4.75248	4.75248
	$\widetilde{G}_{33}$	0.20412	7.81676	0.50232	0	0.09857	1.05814
G_{41}	$\widetilde{G}_{41}$	3.75	1.66667	0	0	5.10417	0.10417
	$\widetilde{G}_{42}$	0	0	0	0	0	0
	$\widetilde{G}_{43}$	0	3.38362	1.63703	5.58798	5.57547	0.16695
	$\widetilde{G}_{44}$	0	0	0	0	6.23377	0.38961
	$\widetilde{G}_{45}$	1.84615	0.46154	0.46154	0	4.15385	7.38462
	R_{ij}	13.576	19.273	24.478	39.238	59.208	31.196

The number of preferences of pension funds by using a taxonometric method (not taking into account the meaningfulness of criteria and using absolute meanings of indicators of assessed alternatives) is:

$$\underset{(13.576)}{P_1} > \underset{(19.273)}{P_2} > \underset{(24.478)}{P_3} > \underset{(31.196)}{P_4} > \underset{(39.238)}{P_5} > \underset{(59.208)}{P_6} .$$

Conclusions

Fund out peculiarities of pension funds assessment with a view to public information which does not require calculations of indicators. Multi-criteria analysis is conducted by the way of paired comparisons of pension funds, without using absolute meanings of criteria for compared funds which is more convenient for an expert.

Conducting pension funds assessment by taxonometric method does not require considerable volume of comparative assessment from expert, but what is necessary it is a great deal of work to collect absolute factual data. Subjective opinion at the stage of assessment actually does not exist.

Conducted comparisons did not demonstrate complete coincidence of a number of preferences for pension funds assessment (between P_1 and P_2 ; between P_5 and P_6). Given non-coincidence is due to a small group of experts taking part in assessment (only 3 experts) and possible belonging of experts to one type of experts (rather pessimists than realists).

However taking into account the fact that this selection is carried out y different persons, it is advisable that criteria of assessment of preferences of pension funds activities with a view their investment attractiveness (both from the point of view of attraction potential and location potential) should be changed.

References

1. Borisov A., Vališevskis A. Information Fusion in Decision Making under Uncertainty // Proceedings of ICAFS-2008, Eighth International Conference on Application of Fuzzy Systems and Soft Computing ICAFS-2008, SOMIJA, Helsinki, 1-3 Septembers, 2008, p. 261-270.

2. Borisov, F.N.; Krumberg, O.F.; Fedorov, I. P. Принятие решений на основе нечетких моделей: примеры использования. (Decision-making based on fuzzy models: examples of use). Riga: Zinatne, 1990.
3. Ginevičius, R.; Podvezko, V.; Novotny, M. Evaluating Lithuanian Banks from perspective of their reliability to customers by Promethee method. 6th international Scintific Conference. May 13-14, 2010. Vilnius, Lithuania. Business and Management 2010. Selected Paper, 993-999.
4. Ginevičius, R.; Zubrecovas, V. Selection of Optimal Real Estate Investment Project Basing of Multiple Criteria Evaluation Using Stochastic Dimensions. *Journal of Business Economics and Management.*2009, 10(3): 261-270.
5. Jakimavicius, M.; Burinskiene, M. Assessment of Vilnius city development scenarios based on transport system modeling and multicriteria analysis. *Journal of Civil Engineering and Management.* 2009, 15(4): 361-368.
6. Kampuse, S. Suitability to Freezing of Berries from Different Raspberry, Black, Red and White Currant Cultivars Grown in Latvia. Summary of Promotion work for acquiring the Doctor's Degree of Engineering Sciences in the Food Science. Jelgava: LLU,2006.
7. Laurinavičius, E.; Ramanauskas, J.; Klimas E. Оценка эффективности инвестиционных проектов (Evaluation of the efficiency of the projects) *Management theory and studies for rural business and infrastructure development*. Nr.17 (2). Research papers.[accessed 2011-02-24].<http://baitas.lzuu.lt/~mazylis/julram/17/54.pdf.>.
8. Melderi, J. Lēmumu pieņemšanas procesa pamatojums uz daudzkritēriju risku analīzes bāzes, risinot drošības problēmas [Grounds for decision-making process of multi-criteria risk-based analysis, addressing security issues]. AZPC-2/01-2009. - Riga: AZPCIS, 2009. BN 9984-625-23-0
9. Romanovs, A. Application of Multi-criteria analysis methods to the tourist information system development. Summary of the Promotion work. Riga: Transport and telecommunication institute. 2006.
10. Vališevskis, A. Decision making in the probabilistic uncertainty and fuzzy situations. Summary of the Promotion work. Riga: RTU, 2006.
11. Voronova, I. Technique of Insurance companies' reliability assessment. *Journal of Business, Management and Education*. 2011, 9(1).[accessed 2011-01-15]. <www.bme. vgtu .it>
12. Voronova, I.; Pettere, G. Rating as an Assessment Instrument of the Insurance Market participants Security. In: 49th International Scientific Conference of Riga technical University "The problems of development of national economy and enterpreneurship": RTU Scientific Conference of Economics and Entrepreneurship (SCEE'2008). Conference Proceedings, Riga: RTU Publishing House, 2009, p. 163–165.
13. Wallenius, J.; Dyer, J.; Fishburn P.,C.; Steuer, R. E.; Zionts, S.; Deb, K. Multiple Criteria Decision Making, Multiattribute Utility Theory: Recent Accomplishments and What Lies Ahead. *Management Science*, Vol.54, No 7, July 2008, p. 1336-1349 [accessed 2011-03-12]. <http://www.terry.uga.edu/~rsteuer/PDF_Links/Ten Year.pdf>.
14. Žvirblis, A.; Krutkienė, I.; Vitkunas, R. Multiple-Criteria Assessment of the Macro Environment of New Construction Companies of the Baltic States. *Issues of Business and Law* [interactive]. Volume 1, 2009. DOI: 10.2478/v10088-009-0005-x [accessed 2011-03-15].<http://versita.metapress.com/content /xh454795n88x5743/fulltext.pdf>.