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PERSONNEL EVALUATION AND SELECTION BY MULTICRITERIA DECISION MAKING METHOD

Abstract. *Personnel evaluation is a multicriteria decision making problem that can significantly affect the future caracteristics and the performance of an organization. The aim of this paper is to demonstrate the implementation of an integrated approach that employs AHP and PROMETHEE together for selecting the most suitable personnel from existing organization manpower in process of its reorganization and downsizing. The essence of the problem is how to minimize subjectivism of decision maker(s), that unfortunately, dominates in this process in Serbia. The related problem includes a Serbian company`s department with five employers that has to be reorganized with reduction of employees on three. The AHP is used to analyze the structure of the personnel selection problem and to determine the criteria weights, and PROMETHEE method is used to obtain the final ranking. The results have shown that the proposed integrated method can be successfully used in solving managerial problems.*

Key words: *personnel, multicriteria decision making, AHP, PROMETHEE.*

JEL Classification: C38, C81

I. Introduction

Many important indicators of organization function, such as effectiveness, efficiency, product quality, team work, innovations, creativity and the final financial effects depend on personnel. Certainly the most important goal of the organization is the achievement of a higher personnel efficiency and consequently a greater financial profit.

But, organizations today cope with dynamical and highly changeable environment. Frequent changes in environment, especially recession and crisis often cause a activity decline of the organizations. This changes induce to organizational downsizing and lock out. But organizations endeavor to hold the best workers and to lay off surplus manpower. At the end, this process of downsizing has a significant affect to organizational performance - Trevor and Nyberg [26] (2008).

Many papers consider personnel selection in a way to choose the best candidate for vacant position from many candidates based on different multicriteria decision making methods (MCDM). This paper deals with opposite problem – to rank the existing personnel in order to hold the best ones and to lay off the others in the downsizing process of a Serbian company. Both problems are very complex and they consider many criteria with various weights. The common idea is to minimize the subjectivism of decision-maker(s) as suggest Kulik at al. [15] (2007).

Anyway, personnel evaluation is a time-consuming and difficult process and can be a hard task for managers. For a proper and effective evaluation, the decision maker may need to analyze a large amount of data and to consider many factors.

Among the available methods, the most popular ones are statistical techniques, scoring models, analytic hierarchy process – AHP, TOPSIS, ELECTRE and PROMETHEE. It is essential to select an appropriate MCDM method to solve the problem under consideration - Bufardi et al. [10] (2004) and Mergias et al. [21] (2007).

The statistical techniques rely on usage of test scores and the measure of accomplishment for the candidate (Nankervis et al. [22] 1993). Other authors (Bowen et al. [4] 1999), evaluate the employees due to their behavior in the engaging process.

The Analytic Hierarchy Process (AHP) is one of the most popular decision-making method that has widely used for personnel evaluation and selection [5, 14, 19, 23, 25, 28]. Also, Lai [16] (1995) consider the personnel selection as MCDM problem with its particular characteristics. This problem requires the accomplishment and aggregation of different factors (Iwamura and Lin [13] 1998).

The fuzzy sets method is often used in the employee evaluation and selection. One of the most important aim of this approach is to minimize subjective judgment in the process of employee evaluation. In the contemporary literature many employee selection problems have been solved by fuzzy sets and logic method [11, 12, 17, 27].

Also, Afshari et al. [1] (2010) for personnel selection use Electra method. In order to obtain criteria weights, they have used AHP method. In the next stage, Electra method of decision making is used for personnel ranking.

The PROMETHEE method is one of the most powerful MCDM method that has some strength in the comparison with other methods. Its advantage is in its simplicity and capacity to approximate the way that human mind expresses and synthesizes preferences when facing multiple contradictory decision perspectives. There is, also appropriate software that supports this method (Decision Lab) and provides a visual tool called Geometrical Analytic for Interactive Aid (GAIA) plane to identify conflicts among criteria and to group the alternatives (Albadvi et al. [2] 2007).

This paper introduces an AHP–PROMETHEE integrated approach for the personnel evaluation with a real world example. The AHP method is used to analyze the structure of the personnel evaluation problem and determine the weights of criteria. In the next stage, the PROMETHEE method will be used for final personnel ranking. In this process the criteria, which have the greatest effect on the personnel evaluation, are determined by a sensitivity analysis.

This paper is divided into five sections. In Section "Introduction", the personnel evaluation problem is discussed. Section "AHP and PROMETHEE methods" introduces these two proposed methods. In Section "AHP-PROMETHEE integrated methodology", a proposed AHP–PROMETHEE combined approach for personnel evaluation process is presented in detail. In Section "A real world example of proposed methodology" the proposed approach is used on a real example in a Serbian company. In last Section "Conclusion", the concluding remarks are discussed.

II. AHP and PROMETHEE methods

AHP method

The Analytic Hierarchy Process (AHP) developed by Saaty [24] (1980). It supports multi-criteria decision making in the manner of ranking the alternatives by taking into account qualitative and quantitative aspects of the decision.

Lee et al. [18] (2001) explains the AHP as a quantitative technique that defines the structure of a complex multi-attribute problem and provides an objective methodology that is applied to a wide variety of decisions in the human judgment process.

The AHP includes the forming a multi-level hierarchical structure of objectives, criteria and alternatives. Based on hierarchical structure, the assessment the relative importance of decision criteria is done. After that, the comparison of the decision alternatives with respect to each criterion is done, and finally, it is determined the overall priority for each decision alternative and the overall ranking of the decision alternatives.

A pair-wise comparison method is used for the assessment of the relative importance of decision criteria and the comparison of decision alternatives with respect to each criterion. This involves the following three tasks: developing a comparison matrix at each level of the hierarchy, starting from the second level and going down, than computing the relative weights for each element of the hierarchy, and finally, estimating the consistency ratio to check the consistency of the judgment.

Let $\{A_1, A_2,..., A_n\}$ be n alternatives, and $\{w_1,w_2,...,w_n\}$ be their current weights. The pair-wise comparison is conducted by usage the scale (1–9), as shown in Table 1.

Table 1. Pair-wise Comparison Scale for AHP preference

Verbal Judgment	Numerical Rating
Equally preferred	1
Moderately preferred	3
Strongly preferred	5
Very strongly preferred	7
Extremely preferred	9
2, 4, 6 and 8 are intermediate values	

A pair-wise comparison matrix that is defined as follows:

$$W = \left[w_i / w_j \right] = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_n \\ \cdots & \cdots & \cdots & \cdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_n \end{bmatrix}$$

This matrix $A=[a_{ij}]$ represents the value of the expert's preference among individual pairs of alternatives (A_i versus A_j for all i, j = 1,2,...,n).
After this, the decision-maker compares pairs of alternatives for all the possible pairs. Based on that, the comparison matrix A is obtained, where the element a_{ij} shows the preference weight of A_i obtained by comparison with A_j.

$$A = \left[a_{ij} \right] = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{bmatrix}$$

The a_{ij} elements estimate the ratios w_i / w_j, where w is the vector of current weights of the alternative.
The matrix has reciprocal properties, which are $a_{ji}=1/a_{ij}$.
The matrices are formed after all pair-wise comparison and the vector of weights $w= [w_1,w_2, . . . ,w_n]$ is computed on the basis of Satty’s eigenvector procedure in two steps. First, the pair-wise comparison matrix, $A = [a_{ij}]_{nxn}$, is normalized, and then the weights are computed.

Normalization

$$a^*_{ij} = a_{ij} \Big/ \sum_{i=1}^{n} a_{ij}$$

for all j = 1,2,..., n.
Weight calculation

$$w_i = \sum_{i=1}^{n} a^*_{ij} \Big/ n$$

for all j = 1,2,..., n.
The consistency of the pair-wise matrix (*CI*) is checked for a valid comparison.

$$CI = (\lambda_{max} - n)/(n - 1)$$

where λ_{max} is an important validating parameter in AHP and is used as a reference index to screen information by calculating the Consistency Ratio (CR) of the estimated vector. CR is calculated by using the following equation:

$$CR = CI/RI$$

where RI is the random consistency index obtained from a randomly generated pair-wise comparison matrix.
The comparisons are acceptable if CR < 0.1. If CR ≥ 0.1, the values of the ratio are indicative of inconsistent judgments. In this case, the original values in the pair-wise comparison matrix A should be reconsidered and revised.
The overall priority for each decision alternative and the overall ranking of decision alternatives is determined by synthesizing the results over all levels. The weighted priorities of the alternatives are added components in order to obtain an overall weight (w_{Ai}) or priority of each alternative over the entire hierarchy.

PROMETHEE Method

PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) is an non-parameter, outranking method for a finite set of alternatives (Brans et al. [6] 1984). This method includes the choice of an appropriate preference function and the weighting given to each variable. The preference function determinates how one object is to be ranked relative to another, and translates the deviation between the evaluations of two samples on a single parameter into a preference degree. The preference degree represents an increasing function of the deviation. A smaller deviations will contribute to weaker degrees of preference and larger ones to stronger degrees of preference. The PROMETHEE method considers six preference functions represented by specific shapes (Usual, U-shape; V-shape; Level, Linear, Gaussian), that depend on two thresholds, Q and P. The indifference threshold Q represents the largest deviation that is considered negligible, and the preference threshold P represents the smallest deviation that is considered as decisive. Q cannot be bigger than P. The Gaussian threshold S is a middle value of P and Q thresholds that is only used with the Gaussian preference function[7, 8].

The PROMETHEE method calculates positive flow (Φ^+) and negative flow (Φ^-) for each alternative according to outranking relations and proportionally with resulting weight coefficients for each criteria. The positive outranking flow is parameter that expresses how much each alternative is outranking all the others. If the value of this parameter is larger ($\Phi+ \rightarrow 1$) the alternative is more important. The higher the positive flow ($\Phi^+\rightarrow 1$), the better the alternative. On the other side, the negative outranking flow expresses how much each alternative is outranked by all the others. The alternative is more important if the value of negative flow is smaller ($\Phi-\rightarrow 0$), i.e. the smaller the negative flow ($\Phi^- \rightarrow 0$), the better the alternative. For the final decision the PROMETHEE II complete ranking is used. It is based on a calculation of net outranking flow value (Φ) that represents the balance between the positive and negative outranking flows. The higher the net flow, the better the alternative (Brans/Mareschal 1994; Anand/Kodali 2008). This procedure is consisted of five stages:

Stage 1. Forming of an impact matrix/double entry table. This matrix for the selected criteria (j=1…n) and alternatives (i=1…m) can be formed by using cardinal (quantitative) and ordinal (qualitative) data.

Stage 2. Selecting and application of the adequate preference function P(a,b). For each criterion, the selected preference function P(a,b) is applied to decide how much the outcome a is preferred to b.

Stage 3. Estimation of an overall or global preference index Π(a,b). The global preference index represents the intensity of preference of a over b.

$$\pi(a,b) = \sum_{j=1}^{n} w_j \cdot P_j(a,b); (\sum_{j=1}^{n} w_j = 1)$$

Stage 4. Estimation of outranking flows for each alternative $a \in A$:

– Positive preference flow (outranking):

$$\Phi^+(a) = \frac{1}{m-1} \sum_{x \in A} \pi(a,x)$$

– Negative preference flow (being outranked):

$$\Phi^-(a) = \frac{1}{m-1} \sum_{x \in A} \pi(x,a)$$

The PROMETHHE method provides two types of alternative ranking – PROMETHEE I that provides a partial ranking of the alternatives with more realistic information about incomparability, and PROMETHEE II that gives a complete ranking of the alternatives by calculating the net flow:

$$\Phi(a) = \Phi^+(a) - \Phi^-(a)$$

Stage 5. Comparison of outranking flows (PROMETHEE I):

$$
\begin{cases}
aP^{I}b \quad \text{if} \quad \begin{cases} \Phi^{+}(a) > \Phi^{+}(b) \quad \text{and} \quad \Phi^{-}(a) < \Phi^{-}(b) \\ \Phi^{+}(a) > \Phi^{+}(b) \quad \text{and} \quad \Phi^{-}(a) = \Phi^{-}(b) \\ \Phi^{+}(a) = \Phi^{+}(b) \quad \text{and} \quad \Phi^{-}(a) < \Phi^{-}(b) \end{cases} \\
aI^{I}b \quad \text{if} \quad \Phi^{+}(a) = \Phi^{+}(b) \quad \text{and} \quad \Phi^{-}(a) = \Phi^{-}(b) \\
aRb \quad \text{otherwise}
\end{cases}
$$

(P,I,R represent preference, indifference and incomparability- respectively).

The relative position of the alternatives in terms of contributions to the various criteria are given by the geometrical analysis for interactive aid (GAIA), that represents the graphical presentation of this parameters.

III. AHP-PROMETHEE Integrated Methodology

There are few facts about usage of PROMETHEE and AHP methods for solving the complex problem – personnel evaluation and selection. Firstly, both PROMETHEE and AHP methods can be singly used for personnel evaluation and selection. Secondarily, both mentioned methods have strengths and weaknesses. Thirdly, PROMETHEE and AHP methods can be efficiently integrated and combined in order to get higher quality results of personnel evaluation.

The aim of this paper is to lessen the weakness and enhance the strengths of these two methods by the process of integration and combination of their proceedings.

Macharis et al., [20] (2004) have analyzed the strengths and weaknesses of both PROMETHEE and AHP methods by the comparative analysis of the both methods. Based on this comparative analysis, it is concluded that a number of favorable characteristics of the AHP method could enhance PROMETHEE, namely at the level of structuring the decision problem and determining weights. The AHP provides a higher level of coherence, correlation, consistency and accuracy of criteria weights, than weights determined on the basis of intuition or a domain specialist's knowledge, which is mostly used in the PROMETHEE method.

In this paper, the proposed integrated AHP-PROMETHEE method for the personnel evaluation and selection problem is consisted of four basic stages: (1) Data gathering, (2) AHP computations, (3) PROMETHEE computations, (4) Decision making.

In the Data gathering stage, personnel from department and the criteria that will be used in their evaluation are determined, and the decision hierarchy is formed.

In the second stage, AHP procedure for forming pairwise comparison matrices is used in order to determine the criteria weights. The individual evaluations are made by using the scale provided in Table 1 to determine the values of the elements of pairwise comparison matrices. Criterium Decision Plus software is used for computations in this stage.
In the third stage - PROMETHEE computations, personnel priorities are found. Firstly, preference functions and parameters are determined by the authors. After this, the partial ranking with PROMETHEE I and the complete ranking with PROMETHEE II and GAIA plane are determined. Decision Lab software is used in this process.
In the last stage - Decision making, the best personnel from all personnel is selected according to the rankings and GAIA plane obtained by PROMETHEE I and II.
The schematic representation of the proposed approach is presented in Figure 1.

IV. A Real World Example of Proposed Methodology

The proposed approach is considered for personnel evaluation and selection in Department of informatics, AGJ Company, town Bor, Serbia. AGJ Company is a project oriented organization and its focus is project management in different fields such as civil engineering, mining, manufacture, etc.
Due to recession the company is enforced to reduce manpower in Department of informatics from five employees to three.

Data gathering

The five employees in Department of informatics are considered the alternatives (P1, P2, P3, P4 and P5) for this decision making problem.
In Table 2 the criteria that have impact on the personnel evaluation and selection are given. These criteria comprise most of all relevant factors for the personnel evaluation and selection.
The decision hierarchy of this problem has three levels. The overall goal of the decision process - the personnel evaluation and selection– is on the first level of the hierarchy. The criteria are on the second level, and alternatives are on the third level of the hierarchy.

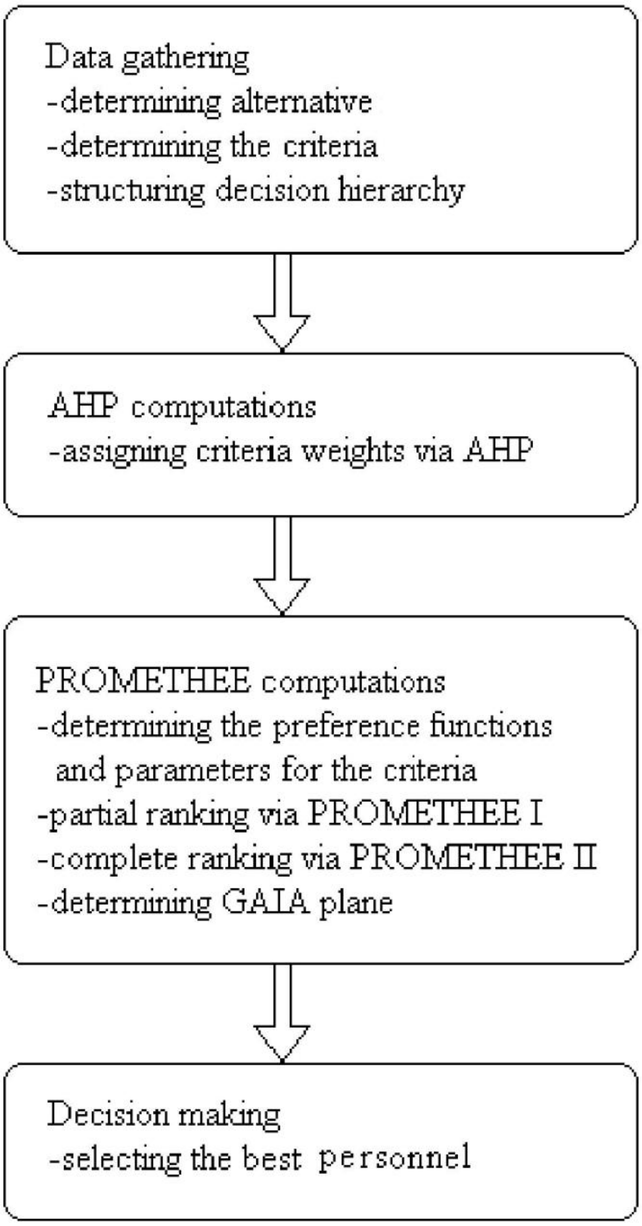

Figure 1. Schematic representation of the proposed method

Table 2. Criteria for personnel evaluation and selection

Criterion	Operation	Annotation
C_1	Computer skills	Computer softwares expertness, especially Project management softwares.
C_2	Past experience	Work on many projects and knowledge for future projects.
C_3	Team player	Good cooperation and relationship with others employees.
C_4	Strategic thinking	Having vision and mission in accordance with company strategy.
C_5	Fluency in foreign language	Knowledge of foreign language, especially English.
C_6	Oral communication skills	Good communication, manners and understanding with all employees in company, as well as with clients.
C_7	Non -absenteeism	Regularity at job. Employee is rarely or never absent from job.
C_8	Willingness	Diligent, persistent, assiduous, dedicated.
C_9	Project management knowledge	Knowledge of principles, phases, tools and technics of project management

AHP computations

On the basis of the decision hierarchy for personnel evaluation and selection problem, the criteria weights are calculated by using AHP method.
Let P = {P1, P2, P3, P4, P5} be the set of employees in Department of informatics, and C = {C_1, C_2, ... , C_9} the set of selection criteria. A decision-maker forms individual pairwise comparison matrix by using the scale given in Table 1. Table 3 shows the 9 x 9 pair-wise comparison matrix constructed to express the decision-makers' empirical estimate of the level of importance for each individual criterion. The maximum eigenvector was obtained from this matrix by the Criterium Decision Plus software.

Table 3. Pairwise comparison matrix for criteria and weights

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9
C_1	1	3	5	5	6	6	3	3	1
C_2		1	3	2	3	3	1	1	1
C_3			1	1	2	2	1	1/2	1/4
C_4				1	2	3	2	1	1/3
C_5					1	1	1/3	1/5	1/5

C_6	1	1/3	1/3	1/5
C_7		1	1	1/3
C_8			1	1/2
C_9				1

Table 4 presents the results obtained from the computations from the pairwise comparison matrix.

Table 4. Results obtained from AHP computations

Criteria	Weights	CR
C_1	0.273	0.027
C_2	0.124	
C_3	0.060	
C_4	0.083	
C_5	0.034	
C_6	0.034	
C_7	0.084	
C_8	0.105	
C_9	0.203	

The Computer skills (C_1), project management knowledge (C_9), past experiance (C_2) and Willingness (C_8) are determined as the most important criteria in the personnel evaluation and selection process by AHP. The Consistency Ratio of the pairwise comparison matrix is calculated as 0,027<0.1, meaning that the weights are shown to be consistent, and they can be used in the decision making process.

PROMETHEE Computations

On the basis of the evaluation criteria, personnel are evaluated and the evaluation matrix is formed. In this process, all criteria have a qualitative structure or an uncertain structure that cannot be accurately measured. The qualitative evaluation has been done by an expert on a 5-point scale – Table 5. The worst category is very poor (numerical value 1), and the best category is very high (numerical value 5).

Table 5. Qualitative scale

Qualitative value	Very poor	Poor	Average	High	Very high
Numerical value	1	2	3	4	5

The evaluations of these five alternatives (personnel), according to the previously stated evaluation matrix, are displayed in Table 6.

After the evaluation matrix is determined, personnel are evaluated by the Decision Lab software. The positive flow (φ+), negative flow (φ−) and net flow (φ) values are shown in Table 7.

Firstly, the partial ranking is determined via PROMETHEE I (Fig. 2) on the basis of the flow values in Table 7. PROMETHEE I uses positive and negative flow values to find the partial ranking.

Table 6. Evaluation matrix

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9
Unit	-	-	-	-	-	-	-	-	-
Max/min	max	max	max	max	max	max	max	max	max
Weights	0.273	0.124	0.060	0.083	0.034	0.034	0.084	0.105	0.203
Preference function	Level	Level	Level	Level	Level	Level	Level	Level	Level
A_1	5	4	3	5	3	3	5	4	4
A_2	3	3	3	4	4	4	5	4	3
A_3	4	5	5	3	4	4	5	3	3
A_4	3	2	3	2	3	3	4	4	4
A_5	3	1	3	4	4	3	4	4	5

Table 7. PROMETHEE flows

Alternatives	φ+	φ−	φ
A1	0,1800	0,0075	0,1725
A2	0,0259	0,0825	-0,0566
A3	0,1075	0,0358	0,0717
A4	0,0000	0,1296	-0,1296
A5	0,0611	0,1191	-0,0580

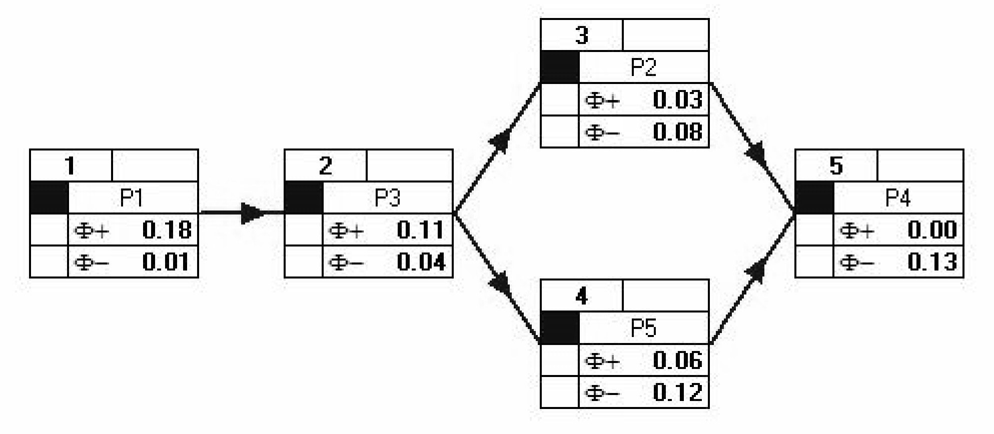

Figure 2. PROMETHEE I partial ranking

Employee P4 is determined as the worst alternative according to the PROMETHEE I partial ranking. Employee P1 is preferred to all others employees. Employees (alternatives) P1 and P3 are preferred to P2, P5 and P4 alternatives. Also, employees P1, P3, P2 and P5 are preferred to employee P4. On the other hand, employees (alternatives) P2 and P5 are incomparable alternatives. It is obvious that PROMETHEE I did not provide information about the best alternative.
The best alternative is identified by PROMETHEE II complete ranking (Fig. 3). Net flow values given in the last column of Table 7 are used in this process, too.
Employee P1 is selected as the best alternative based on the information provided by PROMETHEE II, and the other employees (alternatives) are ranked in the order of P3, P2, P5 and P4.

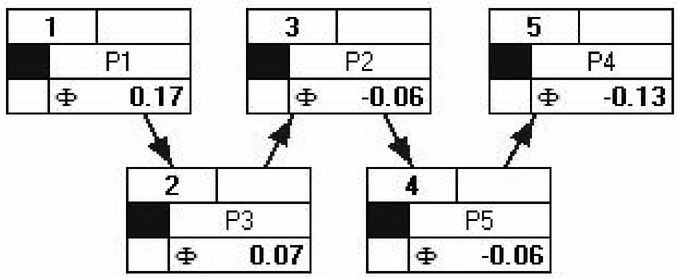

Figure 3. PROMETHEE II complete ranking

The Decision Lab software package enables usage of GAIA appendix (Geometrical Analysis for Interactive Assistance). Δ value is satisfactory (Δ =90.89 %), where Δ presents the measure of the amount of information being preserved by the defined model. In the real world, the value of Δ should be larger than 60%, and in most cases larger than 80% (Brans/Mareschal [9] 1994).
The GAIA plane allows to easily determine the discriminative strength of each criterion, as well as the aspects of consistency and inconsistency as the quality of each alternative by every criterion. On the GAIA plane the alternatives are shown by triangles, and the criteria are presented as axes with square endings.
The eccentricity of the position of square criteria is representing the strength of influence of that criterion, while the similarity in preference among certain criteria is defined with almost the same direction of axes of these criteria.
For the ranking, it is possible to determine the agreement among criteria C_1, C_4, C_5, C_6, C_7, C_8 and C_9, while the criteria C_2 and C_3 are not in compliance with other criteria. Also, the alternative position (triangles) determines the strength or weakness in relation to the alternative criteria. The closer orientation axis of the

criteria to an alternative shows the better position of the alternative according to that criteria. The alternative P1 (Cluster A) in Figure 4 can be determined as the best option because it is the closest alternative regarding the axis direction of criteria with the greatest impact (C_1,), and is directed to the nearest position of the decision stick *pi*, which defines the compromise solution in accordance with the weighted criteria. Contrary to it, the alternatives P5 and P4 are the worst ones because they are not good by any criterion (Cluster B), and it is opposes to the direction of the decision stick *pi* which results have also been obtained through the PROMETHEE ranking.

Decision-making

Thanks to integrated AHP and PROMETHEE method we have gained the personnel rank in the Department of informatics. According to the computations, in the reducing manpower process from five to three employees, it is decided that company should hold the employees P1, P2 and P3 and lay off the employees P4 and P5 in the downsizing process.

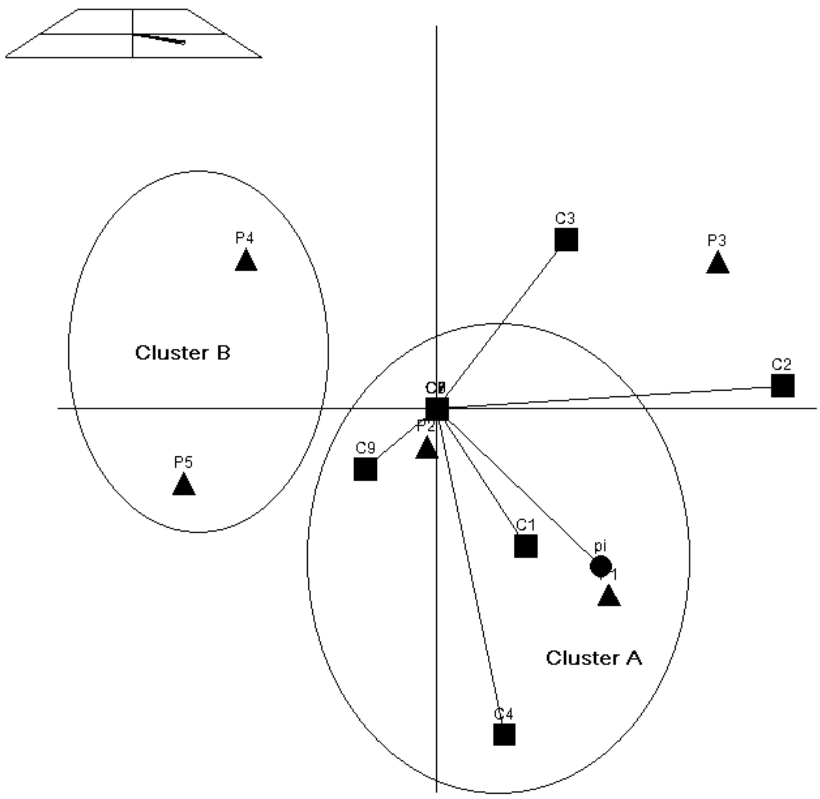

Figure 4. GAIA plane for personnel evaluation and selection

Table 8. Stability intervals

Criteria	Weight	Min	Max
C1	0.273	0.0043	Infinity
C2	0.124	0.1218	0.4105
C3	0.060	0.0000	0.2212
C4	0.083	0.0000	0.5965
C5	0.034	0.0000	Infinity
C6	0.034	0.0000	Infinity
C7	0.084	0.0000	Infinity
C8	0.105	0.0000	Infinity
C9	0.203	0.0000	0.2067

The integrated AHP and PROMETHEE method also enable the sensitivity analysis how the variation in the criteria weights after the decision will affect the ranking. The results of sensitivity analysis are given in Table 8. Table 8 gives for each criterion the limits within the weights' values can vary without changing the PROMETHEE II complete ranking. From the result of the sensitivity analysis, it is clear that Project management knowledge (C_9) have the greatest impacts on the complete ranking (the smallest limits range within the weights' values can vary without changing the PROMETHEE II complete ranking).

V. Summary and conclusions

In this paper, a decision approach is provided for personnel evaluation and selection problem. Personnel evaluation and selection is one of the most important decision made in a company. The selection of a suitable personnel requires the consideration of a numerous criteria. This selection problem is based on the comparisons of employees (alternatives) according to the identified criteria.

An integrated AHP and PROMETHEE decision making method has been used in the proposed approach for personnel evaluation and selection in Department of informatics due to downsizing process. The proposed approach differs from the present personnel evaluating and selection in the literature. Here, AHP is used to assign weights to the criteria for personnel evaluating and selection, while PROMETHEE is used for the complete ranking of the employees. The PROMETHEE has used in its computations the weights obtained from AHP, and the alternative priorities are determined based on these weights. In this study it was shown that the calculation of the criteria weights is important in the PROMETHEE method, and they have important impact on the alternative ranking.

The proposed integrated method can help decision-makers to easily choose the best personnel and analyze factors and attributes. The strengths of this approach over the existing methods are as follows: the PROMETHEE method takes into account the criteria weights obtained by AHP method that have a low degree of decision-maker subjectivity, than PROMETHEE uses the preference function of each criterion, which is determined by the decision-makers; each criterion is evaluated on a different basis, and it is possible to make better decisions. PROMETHEE I provides a partial ranking to identify the alternatives that cannot be compared and the alternatives that are indifferent. PROMETHEE II provides a complete ranking for alternatives. The GAIA plane suggests a differentiation power to the criteria, similar criteria, independent criteria and opposite criteria. Also, PROMETHEE method enables a sensitivity analysis of the results, and determines the most effective criterion in decision making process. These opportunities are not available in current methods, such as AHP, fuzzy AHP, ELECTRE, TOPSIS, etc.
Therefore, on the basis of the obtained results by the proposed integrated AHP and PROMETHEE method, the most suitable employees for Department of informatics are P1, P2 and P3. Employees P4 and P5 are worse ranked according to defined criteria, so they will be lay off in the process of reducing manpower in this department from five to three employees.

The proposed model has only been implemented on a personnel evaluation and selection problem in the AGJ Company, but the company management has found the proposed model satisfactory and implementable.

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