PERSONNEL SELECTION IN AN ACCOMODATION ENTERPRISE BY PROMETHEE METHOD[*]

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Abstract

One of the most significant functions of human resources management in enterprises is the selection of the right personnel for the right work. It is a multiple criteria decision-making problem addressing the criteria affecting personnel selection process and providing the assessment of more than one alternative. Front desk is among the key departments of hotel enterprises for the selection of the personnel to be recruited. Such personnel working at the front desk performs certain duties such as accepting the visiting customers who will stay in hotel or accommodation enterprises, making registration and controlling the hotel accounts as well as communicating with the customers already accommodating or wishing to accommodate in these enterprises. Front desk (reception) and the personnel working in this departmentis of crucial importance for a good image and demand about the enterprise since the visitors get their first impression about the hotel here. This study aims at selecting the front desk personnel of the model accommodation enterprise and systematically performing this selection process through Promethee Method, one of the multiple criteria decision making methods in Operational Research. In this study, precedence of the candidate front desk personnel who have made job applications to a hotel in Kütahya, belonging to a company providing service both in Turkey and many other countries is identified and evaluated by the help of Promethee method. It is believed that this study will guide and be useful for the evaluation of the candidate personnel on the basis of various criteria and through Promethee method, which is a scientific method and for the quick and efficient selection of the most appropriate personnel with respect to personnel selection process of accommodation enterprises.

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1. INTRODUCTION

While the service sector getting more important within the last years continues to grow and develop in the whole world, the desire to make much use of its benefits leads to competition among the enterprises. It covers the generation of a service such as accommodation, catering, travel etc. which cannot be handled and stored but formed to meet human needs other than a physical product. If a service can persuade and satisfy a consumer or a customer preferring the enterprise about the quality, then the customers will be pleased and keep on visiting this enterprise; thus, a positive image will be ensured about this enterprise.

Hotels are one of the most important enterprises carrying out activities in the service sector. They are in fact in the nature of accommodation enterprise; however they can be defined as enterprises established to meet the needs of travellers such as accommodation and catering in particular and entertainment; and whose personnel, architecture, practices and all relations with the customers are subject to certain rules and standards (Çakır,2002:2). They should provide various quality services and their guests should leave the hotel in a satisfied manner if they wish to survive and achieve their goals in this intensely competitive atmosphere like the other enterprises. Only then can the hotels succeed. The most significant difference between the hotels and industrial enterprises is that the hotels are labour intensive enterprises; thus, those providing services or the main service elements in the hotels are the people. Therefore, the ability of the human management resources in the hotels to select the eligible personnel for the right work will help the enterprise increase its success, productivity and profitability, accordingly.

In a hotel in which many personnel working in a harmonised and interactive manner with each other are employed, front desk is the main relation point between the accommodation enterprise and the guest where the incoming travellers are first met, their checks-in and departures are recorded and their invoices are prepared. The front desk personnel shaping the first image about the hotel with his appearance, behaviours and work performance is expected to have a good communication system helping to establish good relations with the guests and provide service delivery which may greatly affect the satisfaction of the guests. Therefore, human resources managers are aware of the fact that the selection of the front desk personnel among the eligible candidates in terms of his personality, capabilities and professional qualifications is of high importance for the success and productivity of the enterprise (MEB,2011:1-17).

This study focuses on the selection of the front desk personnel who have a key role in accommodation enterprises. One of the multiple criteria decision- making methods in operational research, PROMETHEE method is used for the selection of the most eligible person meeting the requirements of the job among talented candidates. The precedence of the candidate front desk personnel who have made job applications to a hotel in Kütahya, belonging to a company providing service both in Turkey and many other countries is identified and evaluated by the help of Promethee method based on various criteria. It is concluded the use of the Promethee method, which is a scientific method, for the right, quick and efficient personnel selection, one of the most important duties of the human resources department, will considerably be useful and helpful for the managers and human resources department;

thus accelerating the decision making process. Promethee method has been explained in detail in the following section. In the third section, the selection process of the most eligible front desk personnel among the candidates has been examined step by step. The evaluation of the analysis, the importance and contributions of this study has been addressed in the conclusion section.

2. PROMETHEE METHOD

The enterprises operating in an intensively competitive environment should make right, immediate and effective decision. Multiple criteria complying with the objective should be taken into consideration altogether in the decision- making process. To that end, multiple criteria decision making techniques are used. In literature, the primary multiple criteria decision- making techniques are listed as Analytical Hierarchy Process (AHP), Analytical Network Process (ANP), ELECTRE, TOPSIS, PROMETHEE and VIKOR.

PROMETHEE (Preference Ranking Organisation Method for Enrichment Evaluations) method is a multiple criteria decision- making method developed by the Belgian scientists Jean Pierre Brans and his colleagues in 1982 (Brans and Mareschal, 2002;164). This method developed to eliminate the practical challenges in the present methods utilised to identify priorities in the literature is used effectively today (Dağdeviren and Eraslan, 2008:70).

Two kinds of information are required to implement Promethee method; one of these is the relative importance (weights) of the criteria and the second is value of the alternatives to the criteria as per the preference (function) of the decision- maker (Albadvi and et al, 2007;674).

Some advantages of PROMETHEEE can be listed as follows: (Tuzkaya, et al., 2011: 145; Karakaşoğlu, 2008:49):

a)   It is a user-friendly ranking method;

b)   It can be applied in an efficient manner in case of planning problems experienced in the real life;

c)   Since PROMETHEE method considers the preference function of each criterion identified by the decision-makers, each criterion may be evaluated disparately. Thus, a better decision is obtained.

d)   PROMETHEE I method provides a partial ranking after identifying alternatives which cannot be compared with each other.

e)   PROMETHEE I and PROMETHEE II help the partial and complete ranking of alternatives. Besides these, PROMETHEE IV is related with multiple objective decision- making problems and can evaluate an indefinite number of events. However, PROMETHEE V is used for the evaluation of a limited number of alternatives classified under groups.

In literature, Promethee method is applied in many areas such as outsourcing choices, the choice of manufacture strategies, the choice of suppliers, the choice of information technology strategies, the choice of facility location, finance and investment decisions. Some application examples are shown in Table 1.

Steps of PrometheeMethod

Steps of the Promethee method can be listed as follows:

Step 1: In PROMETHEE method, firstly the alternatives of the problem, the criteria, and the weights with regard to criteria are identified and then a data matrix is determined for these values. Table 2 presents the data matrix for A = (A,B,C,…) alternatives.

Step 2: Preference functions are determined depending on the nature of the criteria and the required features of the alternatives associated with the criteria. Preference functions enable the decision makers to limit the criteria according to the values determined by him (Yaralıoğlu, 2010). Preference functions to be used during the application of the method are given below Table 3 (Brans et.al, 1986: 231):

Preference functions are

1- Type I (Usual),

2- Type II (U) shape,

3- Type III (V) shape,

4- Type IV (Level),

5- Type V (Linear),

6- Type VI (Gaussian) (Chou et.al. 2004: 53).

Step 3: Based on the preference functions identified for criteria, common preference functions obtained through pairwise comparisons are determined for alternative pairs under the alternative set (Soba, 2012:4713).

When A and B represent two decision points, the below given equation is used for the common preference function.

$$P(A,B) = \begin{cases} 0, & f(A) \le f(B) \\ p[f(A) - f(B)], & f(A) > f(B) \end{cases}$$

Step 4: Based on the identified common preference functions, the below given equation is used to determine preference indices for each alternative pairs.

$$\pi(A,B) = \sum_{i=1}^{k} w_i \times P_i(A,B)$$

Step 5: Positive and negative outranking flows are determined for the alternatives. Positive outranking flow (Φ^+) expresses how an alternative is outranking all the others. Negative outranking flow (Φ^-) expresses how an alternative is outranked by all the others (Brans and Mareschal, 2012;172). Positive and negative flows are calculated as given below, respectively:

$$\Phi^+(A) = \frac{1}{n-1} \sum \pi(A,x)$$

$$\Phi^-(A) = \frac{1}{n-1} \sum \pi(x,A)$$

Here, x represents the alternatives other than A, and outranking values for n alternatives is obtained by adding (n-1) value (Yaralıoğlu, 2010).

Step 6: In this step, PROMETHEE I partial ranking is obtained. Partial ranking is made by comparing the positive and negative outranking flows. When A and B represents two alternatives in the alternative set, the below given cases come out.

    a) When one of the following is ensured, A is preferred over B.

$$\phi^+(A) > \phi^+(B) \quad ve \quad \phi^-(A) < \phi^-(B)$$

$$\phi^+(A) > \phi^+(B) \quad ve \quad \phi^-(A) = \phi^-(B)$$

$$\phi^+(A) = \phi^+(B) \quad ve \quad \phi^-(A) < \phi^-(B)$$

    b) When the following is ensured, A and B alternatives are identical.

$$\phi^+(A) = \phi^+(B) \quad ve \quad \phi^-(A) = \phi^-(B)$$

    c) When one of the following is ensured, A and B cannot be compared.

$$\phi^+(A) > \phi^+(B) \quad ve \quad \phi^-(A) > \phi^-(B)$$

$$\phi^+(A) < \phi^+(B) \quad ve \quad \phi^-(A) < \phi^-(B)$$

Step 7: In this step, PROMETHEE II ranks the net outranking preference flows of the alternatives calculated by the below given equation (Perçin and Ayan, 2010: 563).

$$\phi(A) = \phi^+(A) - \phi^-(A)$$

Complete ranking is determined by evaluating all alternatives within the alternative set at the same level through the net outranking flow value.

The below given ranking is decided on depending on the net outranking value calculated.

When $\phi(A) > \phi(B)$, A alternative outranks B.

When $\phi(A) = \phi(B)$, A and B alternatives are identical.

3. APPLICATION

Personnel selection is a process to decide on whether the qualifications of the candidates applying for a vacancy in an accommodation enterprise meet the occupational requirements; and to select the candidate satisfying the mentioned requirements optimally. When this process in which many factors are considered is carried out through traditional methods, it lasts long and the evaluations may be subjective. Accordingly, various quantitative technics and computer programs are utilised to give the most effective decision within a short while by diminishing the subjectivity (Paksoy and Esnaf, 1995:44-46)

In this study, personnel selection for the reception of the hotel in Kütahya, belonging to a company providing service in Turkey and in many other countries is realised through Promethee method which is one of the multiple-criteria decision making methods of the Operational Research. The objective of the study is to effectively determine the most suitable candidate among the candidates applying for front desk or reception vacancy in an accommodation enterprise.

Fifteen criteria to be taken into account during the evaluation of candidates have been determined following the interviews with the human resources manager of the accommodation enterprise and literature review of the practical studies on personnel selection. Criteria taken into account during the personnel selection process are given in Table 4.

Promethee method which is one of the most effective and practical methods in solving the multiple criteria decision making problems necessitates determining the level of importance among the relations of(weight) the criteria, and the criteria based priority function to be used by the decision maker in preferring an alternative. Weight or level of importance of the relation among the fifteen evaluation criteria set out in this study has been determined to have equal priority by the human resources department as the decision maker.

As the evaluation criteria have been identified to have equal priority, weight of each criteria has determined been as "1". Objective function of all criteria seeks maximization. Preference functions of the criteria have also be determined after talking with the human resources specialists and the specialists carrying out the interviews. Knowledge of foreign languages, educational background, communication skills, and paying attention to personal appearance have been identified as the most important criteria in the selection of reception personnel; and therefore, type V function has been set for these criteria in order to prevent grading candidates below the average. Type III function has been preferred for the other criteria with the aim of not ignoring candidates below the average (Table 5).

Evaluation process has been carried based on the steps of the Promethee method expressed in the previous part. In order to find a solution through Promethee, Visual Promethee programme has been utilised. Visual Promethee programme is PROMETHEE GAIA software; it is lucid, and has a practical interface. Moreover, it provides an effective and reliable solution process.

Following the job posting for a receptionist or front desk clerk, seven candidates applied for job in an accommodation enterprise. These candidates constitute the alternative candidates of the Promethee method. Alternative candidates were evaluated according to the previously identified criteria on the basis of the information in the application forms and the interviews made by specialists in that enterprise.

All the required data with regard to the Promethee method (evaluations, functions, weights, etc.) were identified and inserted in to the table. Evaluations were graded between 1 and 10 and data matrix in Figure 1 was formed.

Criteria to be taken as basis in the evaluation, weights assigned to each criterion, alternative preference functions identified on the basis of criteria, alternative candidates and rates of candidates obtained on the basis of criteria can be understood more easily with the multiple criteria table of the Visual Promethee method (Figure 1).

After all the required data is entered into the Visual Promethee programme, each candidate was evaluated through interviews and their negative and positive outranking flows were obtained. Rates of the candidates they had based on the criteria and their ranking is presented in Table 6.

Partial ranking is obtained following the determination of the outrankings. The best candidate in the ranking made according to the partial outrankings is Candidate 7. Candidate 6 ranks the second and his/her rates are close to the Candidate 7. Similarly, rates of Candidate 2, Candidate 1 and Candidate 4 are close. Candidate 3 ranks the last. The partial ranking obtained through Visual Promethee programme by taking positive and negative outrankings into account is presented in Figure 2.

According to the Figure 2, Candidate 7 and Candidate 1, and Candidate 1 and Candidate 2 are not compared and the partial ranking is carried out accordingly. Diagram on the complete ranking of the candidates based on their negative and positive outrankings obtained by Visual Promethee is presented in Figure 3.

According to the complete ranking obtained following the analyses based on the criteria determined for personnel selection process, Candidate 7 is the best candidate. Candidate 6, 5, 2, 1,4 and 3 follow Candidate 7, respectively.

The criteria underlying the strengths and weaknesses of the candidates interviewed can be examined through Visual Promethee programme. For example, status of Candidate 7 according to the criteria is given in Figure 4.

Candidate 7 obtained the highest points with respect to the criteria of analytical thinking and persuasive ability. Candidate 7 is only weak in terms of the criterion of expression skill; and his/her other criteria are all positive.

Taking into account that the criterion of expression skill is a non-negligible important criterion for the front desk personnel, evaluation of the criteria in terms of Candidate 6 who ranks the most close to Candidate 7 may be considered.

When the Candidate 6 is evaluated on the basis of the criteria, it is seen that Candidate 6 is better than Candidate 7 in terms of the criterion of the expression skill, which may be regarded as an important feature of front desk personnel although he/she is weaker in terms of the criteria of adaptable to busy schedule and analytical thinking skill. Even if the criteria are weighted equally, if employers do not want to recruit a candidate who is weak in terms of the expression skill criterion, Candidate 6 may then be preferable.

4. CONCLUSION

Labour force is one of the most important factors that affect the continuity and success of enterprises in a highly competitive environment. Therefore, it is necessary to select the suitable personnel through an effective selection process highlighting all features of the candidates and by defining the qualifications and criteria of the job properly.

In this study, decision making problem with regard to the selection of front desk personnel for hotels operating in a labour intensive field under the service sector has been reviewed. Personnel selection process of seven candidates applying to a hotel in Kütahya, belonging to a company providing service in Turkey and in many other countries is realised through Promethee method.

Promethee method which is a multiple criteria selection and ranking method, has been applied in Visual Promethee programme. Fifteen criteria for personnel selection, weights of each criterion, and data of 7 candidates subject to evaluation were entered into the programme; and the candidates were graded based on the criteria. Analysis results have been obtained by determining the partial and complete rankings. When the ranking is examined, it has been noticed that the leading candidates relatively outrank the others. Effectiveness and accuracy of the selection process has been tried to be enhanced through the Promethee method by ensuring simultaneous evaluation under equal conditions.

It has been found out that when Promethee method, one of the operational research techniques is utilised during the personnel selection process which is an important point for enterprises, especially for labour intensive ones, the selection process can be finalised with less cost in a more systematic, rapid, and simple manner and also can be interpreted more easily.

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APPENDICES

Appendix 1: Tables

Table 1: Some Studies based on Promethee Method

Brans and Mareschal (1992) developed Promethee V method.	Korukoğlu, Ballı and Karasulu (2007) Applying Promethee method for automobile selection with fuzzy inputs	AthawaleChakraborty (2010) Promethee II method in facility location choice
Y.I. Topcu- F. Ulengin (2004) The choice of energy resources by Promethee	Dağdeviren and Eraslan (2008) The supplier choice of an enterprise by Promethee method	Dulmin and Mininno (2003) Evaluating the suppliers by a firm active in transportation sector in Italy the suppliers through Promethee II method
Goumas and Lygerou (2000) An evaluation on alternative energy utilization scenarios	Ulucan and Atıcı (2009) Ranking of wind plants projects by Promethee technique	Kalogeras, Baourakis, Zopounidis and Van Dijk'in (2005) Performance evaluation by the use of variables applied principle component analysis for the agricultural products firms in Greece through Promethee method
Castro and Lopez (2004) Integer fuzzy programming approach based on Promethee V	Akkaya and Demireli (2010) Applying multiple criteria decision making problems in finance	Dağdeviren and Eraslan (2008) Evaluating the suppliers by an enterprise manufacturing household electrical appliances in Ankara through Promethee II method
Elevli and Demirci (2004) the choice of the best underground ore transport system for chrome.	Yılmaz and Dağdeviren (2011) Solving supply chain problem by Promethee method (Decision LAB software)	Rao and Patel (2010) Decision making in the manufacturing environment by Fuzzy Logic, AHP and Promethee methods
Cavallaro (2005) Listing energy projects	Tuzkaya, Özgen and Gülsün (2011) Solving the choice of material transport systems problem by Promethee method	Cavalcante, Ferreira and Almeida (2010) Preventive maintenance decision model based on Promethee II integrated by Bayes approach
Albadvi, Chaharsooghi and Esfahanipour (2007) Evaluating investment decisions	Özgüven (2012) Evaluating three shopping sites by Promethee method	Beynon and Wells (2008) Preference ranking based on exhaust emissions of motor vehicle group

Araz, ÖzfıratveÖzkarahan (2007) Ranking of available outsources of a company based on criteria identified for the goalsand outsources of a textile company through Promethee method	Rao and Rajesh (2009) Choice of software in enterprise through Promethee method	Kundakçı (2009) A model offer based on Fuzzy AHP and Promethee and Choice of notebooks in a production company
Dağdeviren (2008) Decision making in machine selection: an integrated approach with AHP and PROMETHEE	Chen, Hung and Cheng (2011) Applying Linguistic Promethee method in investment portfolio decision making	

Table 2: *Data Matrix*

		Criteria				
		f_1	f_2	f_3	...	f_k
Alternatives	A	$f_1(A)$	$f_2(A)$	$f_3(A)$	...	$f_k(A)$
	B	$f_1(B)$	$f_2(B)$	$f_3(B)$	...	$f_k(B)$
	C	$f_1(C)$	$f_2(C)$	$f_3(C)$	...	$f_k(C)$
	…	…	…	…	…	…
Weights		w_1	w_2	w_3	…	w_3

Table 3: Function Types

Type	Parameter	Function	Graph
Type I (Usual)	---	$P(x) = \begin{cases} 0, & x \leq 0 \\ 1, & x > 0 \end{cases}$	
Type II (U-shape)	l	$P(x) = \begin{cases} 0, & x \leq 1 \\ 1, & x > 1 \end{cases}$	
Type III (V-shape)	m	$P(x) = \begin{cases} 0, & x \leq 0 \\ \dfrac{x}{m}, & 0 < x \leq m \\ 1, & x > m \end{cases}$	
Type IV (Level)	q, p	$P(x) = \begin{cases} 0, & x \leq q \\ \dfrac{1}{2}, & q < x \leq q + p \\ 1, & x > q + p \end{cases}$	
Type V (Linear)	s, r	$P(x) = \begin{cases} 0, & x \leq s \\ \dfrac{x - s}{r}, & s \leq x \leq s + r \\ 1, & x \geq s + r \end{cases}$	
Type VI (Gaussian)	σ	$P(x) = \begin{cases} 0, & x \leq 0 \\ 1 - e^{-x^2/2\sigma^2}, & x > 0 \end{cases}$	

Table 4: Criteria to evaluate the candidates during the personnel selection process

Selection Criteria for the Personnel			
1	Experience	9	Analytical Thinking Skills
2	Knowledge of Foreign Languages	10	Problem Solving
3	Educational Background	11	Communication Skills
4	Technical Knowledge	12	Representative Ability
5	Focus on Customer Satisfaction	13	Paying attention to personal appearance
6	Familiarity with team work	14	Persuasive Ability
7	Adaptable to busy schedule	15	Expression Skill
8	Willingness to work with		

Table 5: Evaluation Criteria and features of the criteria

No	Criteria	Obj. type	Weight	Priority Function
1	Experience	Max	1	Type III (V-shape)
2	Knowledge of Foreign Languages	Max	1	Type V (Linear)
3	Educational Background	Max	1	Type V (Linear)
4	Technical Knowledge	Max	1	Type III (V-shape)
5	Focus on Customer Satisfaction	Max	1	Type III (V-shape)
6	Familiarity with team work	Max	1	Type III (V-shape)
7	Adaptable to busy schedule	Max	1	Type III (V-shape)
8	Willingness to work with	Max	1	Type III (V-shape)
9	Analytical Thinking Skills	Max	1	Type III (V-shape)
10	Problem Solving	Max	1	Type III (V-shape)
11	Communication Skills	Max	1	Type V (Linear)
12	Representative Ability	Max	1	Type III (V-shape)
13	Paying attention to personal appearance	Max	1	Type V (Linear)
14	Persuasive Ability	Max	1	Type III (V-shape)
15	Expression Skill	Max	1	Type V (Linear)

Table 6: Positive and Negative outranking Flows of Applying Candidates

Ranking	Alternatives (Applying Candidates)	Phi	Phi+	Phi-
1	Candidate 7	0,4917	0,5694	0,0778
2	Candidate 6	0,4778	0,5722	0,0944
3	Candidate 5	0,2694	0,4667	0,1972
4	Candidate 2	-0,2000	0,3000	0,5000
5	Candidate 1	-0,2324	0,2398	0,4722
6	Candidate 4	-0,2806	0,2417	0,5222
7	Candidate 3	-0,5259	0,1444	0,6703

Appendix2: Figures

Figure 1: Visual Promethee Identification and Data Entry Screen

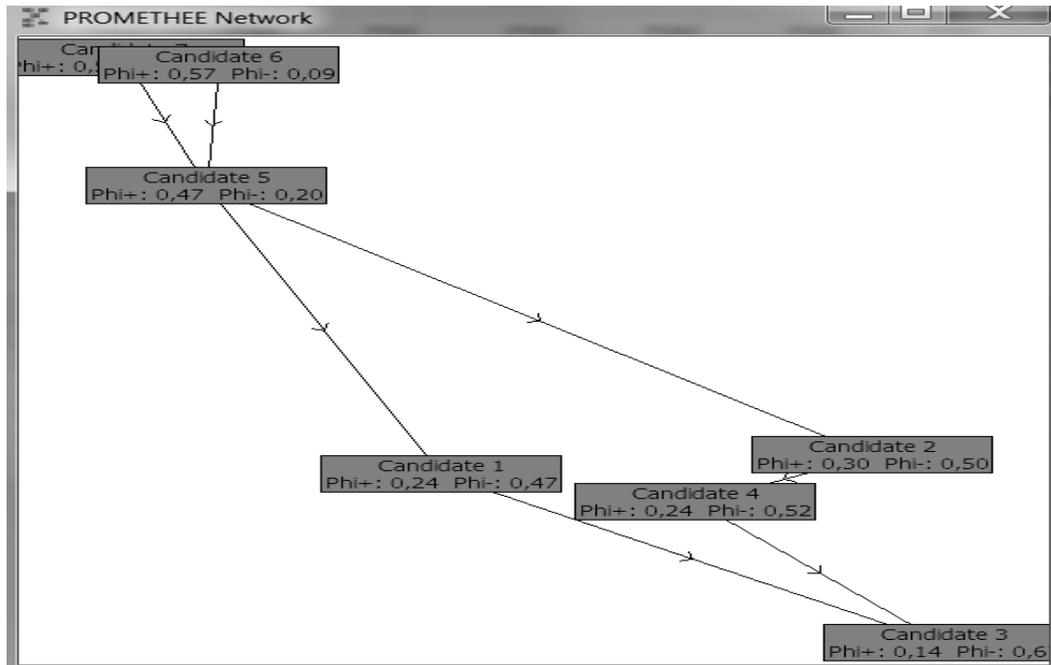**Figure 2:** Partial Ranking of the Candidates by Visual Promethee

Figure 3: Complete Ranking of the Candidates by Visual Promethee
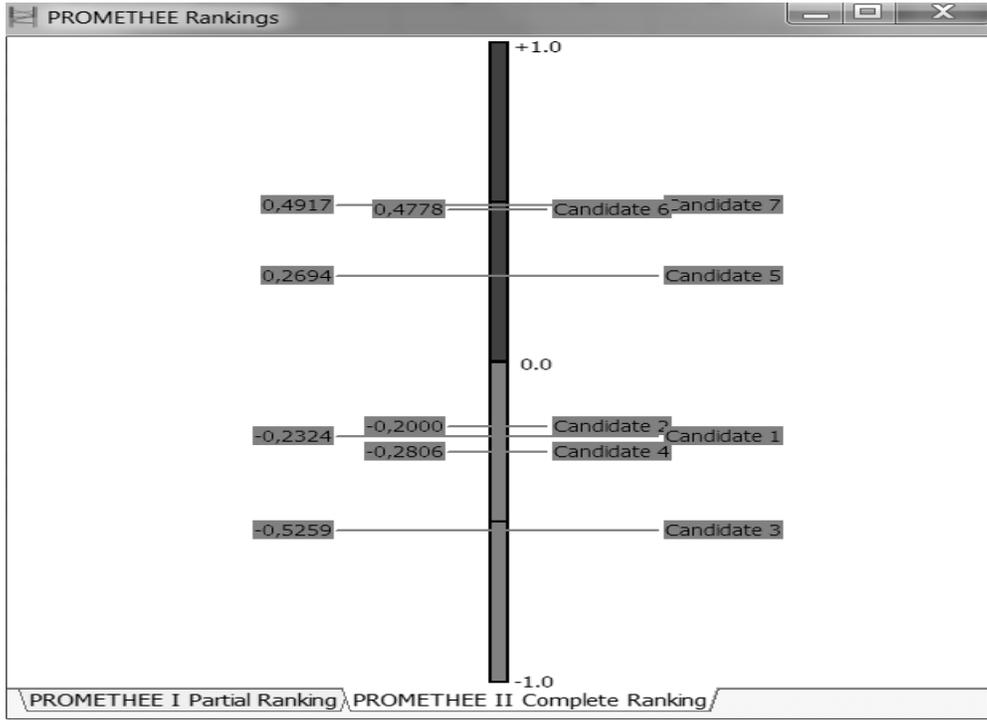
Figure 4: The Criteria that the Candidate 2 is weak or strong

Figure 5: The Criteria that the Candidate 6 is weak or strong