Improved techniques PROMETHEE preference for the changed conditions

Amin Akafpour, Dr. Maghsood Amiri, Dr. Naser Hamidi

Islamic Azad University, Qazvin Branch, Department of Management, Qazvin, Iran
E-mail address: a.akafpour@qiau.ac.ir

Abstract: PROMETHEE II outranking method is developed some ELECTRE methods which are used for different conditions specific decision. This method requires the absolute values measures of the matrix, While some issues, such as deciding the amount of perishable products the absolute values is not available And a range of values is available for the decision maker. In this paper, PROMETHEE II method to use the standard deviation values instead of range of values has been developed.
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Introduction:

Decision procedures can support different types of decisions. Identify the best options to decide from a set of options, select the option from the top menu, and complete ranking of alternatives, types that can be outlined. PROMETHEE methods like ELECTRE insisted on select the options that the superiority of one or more of the one or more indicators have weaknesses. VIMDA and ZAPRES methods also use the same approach. PROMETHEE II ranking of options for making the decisions that are intended to be used. The weakness of PROMETHEE method is increasing the number of coefficients is computed by increasing the number of indicators. Against this weakness, The advantage of this method that can be used for things that have a lot of options. in terms of uniqueness methods, such as other outranking methods like ELECTRE and PROMETHEE are not general application and they are specific and do not lead to the production of general formula. The PROMETHEE method for decision-makers involved will need to weigh the index as the input features of complex tasks Laryshf is. The preferred viewing method, Hobbes Investigations (1986) ELECTRE and PROMETHEE method is used in the fourth. Rating of PROMETHEE methodology used in the research were clear and easy to understand 6 of 7 techniques have been studied.

As it is mentioned in this article using the PROMETHEE II ranking of options is that they are merely indicators of the range of values are not absolute. This range has a standard value (mean interval) so that higher and lower than the standard value (within the range) are accepted as the standard deviations.

Perishable products generally have such a feature is, perishable products from the milk as one of the acceptable interval have several dairy factories quality control department. Among the criteria for selection for admission milk can be characterized in chemical factories, acidity, PH, fat, non-fat dry milk, density, alcohol test, test pH after boiling and freezing points pointed out that this on 5 of focus are listed in Table 1.

Table 1. freezing points pointed

About admission	Indicators of milk
% 3.2 Min	x_1 **: Fat**
% 1.029 Min	x_2 **: Density**
% 8 Min	x_3 **: Nonfat dry**
6.6-6.8	x_4 **: PH**
14-16 Dornyk'degree	x_5 : **Acidity**

* The values listed in Table 1 and the parameters of the standard for x_4 and x_5 are 6.7 and 15.

The product (milk) and milk production centers in the province of Qazvin, Alborz (Iran) was determined that 5 of them center to the accident were as follows:

Table 2. The product (milk) and milk production

Indicators of milk					Milk procurement centers
Acidity	PH	Nonfat dry	Density	Fat	
15.5	6.6	%7.6	%1.031	%3.86	A
14	6.6	%8.5	%1.3	%3.25	B
14.5	6.78	%8.1	%1.03	%3	C
14.6	6.8	%8.4	%1.031	%2.9	D
15.3	6.6	%7.6	%1.03	%3.1	E

Literature study:

MCDA (Multi-criteria Decision Aid) is part of operations research (OR) has developed rapidly in recent decades. MCDA options with one hand rankings (from best to worst) of them have dealt with the

another category theory and methodology can be complex issues to management, engineering, science and other human activities have provided a.

PROMETHEE(Preferences Rankly Organization Method for Enrichment Evaluations)is one of the outranking methods for MCDA that developed by Brams, vincke (1985). (M.Behzdioan and R.B. Kazemzadeh 2010).

PROMETHEE is other branch of ELECTRE method, Brans, Vincke ELECTRE method refers to the relative complexity and have noted that this method requires a lot of parameters that may not have the conceptual parameters for decision-making. PROMETHEE II method in 1982 by Brans at Laval University (Quebec, Canada) were presented. This method is given a numerical score for each option and the option to do a full Ratings (Brans, 1982).

The PROMETHEE method has been used in various fields such that it can include: selection of equipment in production planning by F-PROMETHEE and treatment planning (Dagdeviren, 2011), the approach presented in this paper of 4 parts: 1 - data Collection 2 - F-PROMETHEE3-computing computing ep 4 - the decision is made.

Using F-PROMETHEE in strategic decision to outsource (Y.Hsiuchen & Tine-chin, 2011) projects selected by PROMETHEE (N.Halouni & H.Chabckub, 2009) In this paper, two types of qualitative and quantitative information on the project non-deterministic environment is used. A multi-criteria approach for the selection and maintenance Preventive maintenance (C.Chareonsuk & N.Negarur-1997) that two criteria, cost and reliability of this method has been studied. Integrated multi-criteria decision making methodology for outsourcing management using F-cop, PROMETHEE (C.Araz & P.Mizrah-2002)

Water Resources Planning for the Middle East using PROMETHEE (F.Abu-Taleb & B.mareschal-1995) in this paper as criteria for water quality, quantity, mining, sewage and ... Three categories of high, medium and low yields, and they decide to be.

Nuclear waste management assistance (Th-Biggs & PLKunseh-1990) is used in this paper provide GAIG idea. The entire program of choice in the above article will answer three questions:

- Where? (Schedule 2) - Where? (Place of burial) 3 - How? (Financially) in PROMETHEE II Model applied to multi-objective optimization problems (ROParreoras & J.A.Vasconeelos-2007).

Problem Statement:

As mentioned in some of the decisions are not absolute index values only within a certain range around a standard value, the decision-making process will be difficult. In this paper we seek to answer the question of how to classify the PROMETHEE II method that measures such as these are the payment options?

PROMETHEE II with the expression of a new approach to this question has been answered.

Method PROMETHEE:

PROMETHEE method begins to works with expand a preferable option the scale of the achievement levels for an alternative option to convert to a scale of 0 to 1, (in which 0 Introduce the worst and the 1 Introduce the best). Six general criteria PROMETHEE method is described in Table 3.

Table 3. Difference in performance

Criterion	Criteria Description	Definition	Parameter
I	**Normal**	**If it's indifferent or worse then it's 0.** **If it's Better then it's 1.**	**have not**
II	**Criterion Quasi**	**If d is smaller or equal than q then it's 0.** **If not it's 1.**	**Q**
III	**Measure w (linear precedence)**	**If it's indifferent or worse then it's 0.** $\frac{d}{q}$ **If is smaller than P then it's 1.**	**P**
IV	**Benchmark level**	**If** $\lvert d \rvert \leq q$ **then it's 0.** **If** $q \langle \lvert d \rvert \leq p$ **then it's 0.5** **If** $\lvert d \rvert \rangle p$ **then it's 1.**	**p,q**
V	**Measure w (linear precedence and indifferent area)**	**If** $\lvert d \rvert \leq q, q \langle \lvert d \rvert, (\lvert d \rvert - q)/(p-q)$ **then it's 0.** **If** $\lvert d \rvert \rangle p$ **then it's 1.**	**p.q**
VI	**Gauss**	**If** $d \langle 0$ **then it's 0.** **If** $d \rangle 0$ **then it's** $1 - e^{-dxd/(2\sigma \times \sigma)}$.	σ **Standard Deviation**

In Table 3, "d" is the mean difference in performance.

Intensity of preferences can be represented by an n × n matrix in which all decision options (n) are compared to each objective. Then the set of weights (wi) are given to indicate the relative importance of the objectives. Multi-criteria preference index for each pair of options are defined as follows:

$$II(a,b)=\frac{\sum_{j\in k} W_j P_j(a,b)}{\sum_{j\in k} W_j}$$

In relation to the above, K is the whole purpose.

The calculation of n × n table can be extended to all options and decisions. For each decision option (a) the mean intensity of priority Decide on other options define with $Q^+(a)$ .Outbound flow is said to $Q^+(a)$ Similarly, The mean intensity of all the options, deciding on decision option (a), define with $Q^-(a)$.

Incoming flow is said to $Q^-(a)$ the net flow $Q(a)$, can be obtained from this relationship: $Q(a)=Q^+(a)-Q^-(a)$.

Method PROMETHEE II:

In this method, the priorities are defined as follows:

Option (a) has priority over than Option (b) if and only if it is $Q(a)\rangle Q(b)$

Option (a) is indifferent to Option (b) if and only if it is $Q(a)=Q(b)$.

Proposed solution:

In this method, the standard deviation values are calculated, then the paired comparison table PROMETHEE and dissolves. The method of paired comparisons for all tables in the standard I (Table 3) is used. this method' purpose is not calculating the values of p and q .

* $\mathbf{d_i}$: deviation or difference between the values criteria i from Tables 1 and 2

* $\mathbf{d^+}$: Deviation high the standard value

* $\mathbf{d^-}$: Deviation below the standard value

- For example:

$d_1^+ \rightarrow$ Deviation high the standard value of the amount of fat

$d_2^- \rightarrow$ Deviation below the standard value of the density.

The calculated values for di in Table 4 are as follows:

Table 4. The calculated values for di

Standard deviation values										Milk procurement centers
d_5^-	d_5^+	d_4^-	d_4^+	d_3^-	d_3^+	d_2^-	d_2^+	d_1^-	d_1^+	
0	**0.5**	**0.1**	**0**	**0.4**	**0**	**0**	**0.002**	**0**	**0.66**	**A**
1	**0**	**0.1**	**0**	**0**	**0.5**	**0**	**0.001**	**0**	**0.05**	**B**
0.5	**0**	**0**	**0.08**	**0**	**0.1**	**0**	**0.001**	**0.2**	**0**	**C**
0.4	**0**	**0**	**0.1**	**0**	**0.4**	**0**	**0.002**	**0.3**	**0**	**D**
0	**0.3**	**0**	**0.1**	**0.1**	**0**	**0**	**0.001**	**0.1**	**0**	**E**

$$D=\begin{array}{c|ccccc} & x_1 & x_2 & x_3 & x_4 & x_5 \\ A & 0.66 & 0.002 & 0.4 & 0.1 & 0.5 \\ B & 0.05 & 0.001 & 0.5 & 0.1 & 1 \\ C & 0.2 & 0.001 & 0.1 & 0.08 & 0.5 \\ D & 0.3 & 0.002 & 0.4 & 0.1 & 0.4 \\ E & 0.1 & 0.001 & 0.1 & 0.1 & 0.3 \end{array}$$

Non-linear normalization method:

$$Norm=\sqrt{\sum_j aij^2} \Rightarrow r_{rj}=\frac{aij}{Norm}$$

$$j_1 \rightarrow Norm=\sqrt{(0/66)^2+(0/05)^2+(0/2)^2+(0/3)^2+(0/1)^2}=0/8$$

$$j_2 \rightarrow Norm=\sqrt{(0/002)^2+(0/001)^2+(0/001)^2+(0/002)^2+(0/001)^2}=0/003$$

$$j_3 \rightarrow Norm=\sqrt{(0/4)^2+(0/5)^2+(0/1)^2+(0/4)^2+(0/1)^2}=0/65$$

$$j_4 \rightarrow Norm = \sqrt{(0/1)^2 + (0/1)^2 + (0/08)^2 + (0/1)^2 + (0/1)^2} = 0/21$$

$$j_0 \rightarrow Norm = \sqrt{(0/5)^2 + (1)^2 + (0/5)^2 + (0/4)^2 + (0/3)^2} = 0/26$$

		x_1^+	x_2^+	x_3^+	x_4^-	x_5^-
	A	**0.825**	**0.666**	**0.615**	**0.476**	**1.923**
	B	**0.062**	**0.333**	**0.769**	**0.476**	**3.846**
N=	**C**	**0.25**	**0.333**	**0.153**	**0.380**	**1.923**
	D	**375/0**	**666/0**	**615/0**	**0.476**	**1.528**
	E	**125/0**	**333/0**	**153/0**	**0.476**	**1.153**

0.3 = w_5 **, 0.3 =** w_4 **, 0.2 =** w_3 **, 0.1 =** w_2 **, 0.1 =** w_1

- Quality Assurance and Food weights were determined according to experts.

Tables of promethee calculating:

0.1 = w_2

	A	B	C	D	E
A		1	1	1	1
B	0		0	0	0
C	0	0		0	1
D	0	1	1		1
E	0	1	0	0	

0.1 = w_1

	A	B	C	D	E
A		1	1	0	1
B	0		0	0	0
C	0	0		0	0
D	0	1	1		1
E	0	0	0	0	

0.3 = w_4

	A	B	C	D	E
A		0	1	0	1
B	1		1	1	1
C	0	0		0	0
D	0	0	1		1
E	0	0	0	0	

0.2 = w_3

	A	B	C	D	E
A		0	0	0	0
B	0		0	0	0
C	1	1		1	1
D	0	0	0		0
E	0	0	0	1	

0.3 = w_5

	A	B	C	D	E
A		1	0	0	0
B	0		0	0	0
C	0	1		0	0
D	1	1	1		0
E	1	1	1	0	

Finnal table for ranking:

$$II(a,b) = \frac{\sum_{j \in k} W_j P_j(a,b)}{\sum_{j \in k} W_j}$$

	A	B	C	D	E	Q^+
A		**0.5**	**0.4**	**0.1**	**0.4**	**0.35**
B	**0.2**		**0.2**	**0.2**	**0.2**	**0.2**
C	**0.3**	**0.6**		**0.3**	**0.4**	**0.4**
D	**0.3**	**0.5**	**0.7**		**0.4**	**0.475**
E	**0.3**	**0.4**	**0.3**	**0**		**0.25**
Q^-	**0.275**	**0.5**	**0.4**	**0.15**	**0.35**	
Q	**0.075**	**-0.3**	**0**	**0.325**	**-0.1**	

$$Q = Q^+ - Q^-$$

Rankinig result:

D→A→C→E→B

Conclusions

In this paper it is investigated by the method PROMETHEE ranking of options with a range of variable values (not absolute), respectively. One of the industries that are associated with large values of a range of dairy products, milk and so has one of these properties was corruptible.

The results of this study show that:

• Since the PROMETHEE method is used for ranking the options that the absolute value of the index, but In this paper, a method has been proposed, that Options were rated as non-absolute values of the index.

•Milk has a variety of acceptance in the time to enter the factory, which is about the acceptance of the quality control department attempted to accept the value of milk . Milk intake in the dairy industry due to chemical characteristics (fat, density, fat-free dry milk, acidity, PH, etc.) is determined, Therefore the input milks ranking is very important to the quality control of dairy factories and chemical characteristics of milk and have to be put it in the solution of the offer made input milk ratings. Obviously, ranked by manufacturers can provide better performance than the fee payable to the center tap and their own production planning sets by worth of their milks.

Corresponding author:
Islamic Azad University, Qazvin Branch, Department of Management, Qazvin, Iran
E-mail address: a.akafpour@qiau.ac.ir

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