

Executive Strategies for Combating Goods and Fuel Smuggling in Iran's Maritime Borders

¹Sohad Jaderi and ²Hassan Jafari

¹Persian Gulf International Educational Branch, Islamic Azad University, Khoramshahr, Iran

²Faculty of Maritime Economics and Management,
Khoramshahr Marine Science and Technology University, Khuzestan Province, Khoramshahr, Iran

Abstract: Humans and goods smuggling is considered one of the secretly transportation and illegal matters that had been so vicious in sociology by running away of paying the specific duty in the custom. Smuggling is a multi-dimensional phenomena that certainly captured red-handed by thousand of factors involved in. to name few ones can be maritime borders, shortcut to wide maritime ways, variety of paths, a lot of stilts on Persian gulf, different entries of smuggling goods, broadcasting the culture of using smuggling goods in society, people views toward illegal goods are some examples for this reason. This applied study trying to survey the ways of how to avoid these factors in southern maritime borders. this study is conducted in three phases, In the first phase we concern of the smuggling goods main factors and their ways and how we can stop that, in the second phase due to Delphi method and study of literature research some strategy for combating smuggling fuel and goods have been identified, finally in the third phase identified strategy have been prioritized according to the Criteria such as Practicability, implementation costs, time needed for implementation and the efficacy in reducing smuggling by use of PROMETHEE and Shannon Entropy methods.

Key words: Goods smuggling • Executive principles • Southern maritime borders • Promethee

INTRODUCTION

Border line which are separating countries from each other are highlighted by narrow lines from that declare a government as an independent politically and geographically nation. There are different considerations towards Iran's modern proved borders. And huge differentiation is found between stipulated calculations toward those considerations [1]. Total long of Iran's borders and strands is 8731 kilometers that includes all maritime shores, rivers and lands. From those 2700 kilometers about 31 percent of that undergoes of Persian Gulf, Oman Sea and Caspian Sea shores [2]. Rivers borders of Iran and vicinity of the country is 1830 kilometer, 20.9 percent and lands borders of Iran and vicinity 4113 kilometers, 47.1 percent and lakes and swamplands about 88 kilometers cited [1]. Those lines between Persian Gulf and Oman Sea are clarified in maps and declared in 25 obvious points [1]. Hence this study is conducted in three phases, In the first phase we concern of the smuggling goods main factors and their ways and

how we can stop that, in the second phase due to Delphi method and study of literature research some strategy for combating smuggling fuel and goods have been identified, finally in the third phase identified strategy have been prioritized according to the Criteria such as Practicability, implementation costs, time needed for implementation and the efficacy in reducing smuggling by use of PROMETHEE and Shannon Entropy methods.

Literature Research: Mir Mohammady [3], in his study under the title of the mutual impact of underground economic and economical security pointed to smuggling as an indirect way of underground economic. We may refer to it as a black economic which is considered smuggling here. He used mathematical and economical calculation on his proof and conclusion.

Yavari [4] studied smuggling imports. In this point he compared formal registered imports of custom with trading exports statistic and by getting the different spectrum of those two, estimating smuggling imports goods.

In another study Mir Mohammady [3] studied smuggling goods and ways of leading smuggling issues in formal and legal ways. The researcher conducted this study by the support of custom and University of Tehran regularly. He has mentioned the smuggling on his study as a pointless and aimless trading policy and tried to lead this action to its proper way and formal importing.

Arab MazarAhmadi [5] on his PhD thesis measured the black economic of Iran in the last three decades very intensively and precisely and he ended up with different factors that shaping and shifting the black economic smuggling and the ways of how to face that. on his study with the following subject: goods smuggling and domestic production crisis, referred to the impact of good smuggling such as yearly destruction jobs between 200 to 400 in the country that itself considered one of the main factors of smuggling and also mention the improper quality of domestic production and the short support for that, again can be another way to use foreign production because of poor economic of the families.

Shariat and Eyoukhani [6] in one of their study concerned about good smuggling through sea and compared it toward land smuggling. In this study there were several ways that considered the most preferred factors which lead the dominance and growth of sea smuggling more than land smuggling such as long borders of Persian Gulf until Oman Sea and islands and seashores. Also these factors paved the way for facing difficulty in order to encounter and face sea smuggling because of their complexity. This study mentioned the facilitation of seashores with special guards for eradication the sea smuggling by offering useful principles.

MATERIALS AND METHODS

This study is considered one of the applied researches according to research goals. Because it is going to apply the specific field on a particular domain. So from this point we can trap it as an applied study. The main concern of this study is to survey the ways and principles of prevention and encountering good and fuel smuggling in IRAN's southern borders. However it is a padding form of its kind it should be notifying here that its nature is based on description and deduction. Because the aim of each descriptive research is to clarify the phenomenon aspects and the aim of the deductive research isto popularization the results. Additionally it is analytical from grounding kind because independent and dependent variables are analyzed too.

Statistics Sample and Subjects: In this study our sample of statistics subjects includes all the experts in ports, maritime crew and southern custom of the country. Due to ambiguity and shortness of exact number of subjects, statistics sample stipulated by questionnaire between 20 individuals from ports and maritime organization experts and by initial estimation of variance in certain level 95 percent from 150 samples estimated. Here research subjects mean the study statistical sample which is 150 persons.

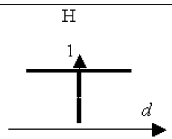
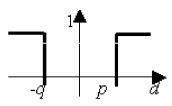
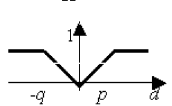
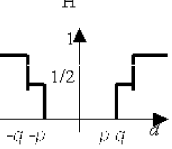
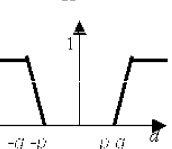
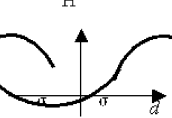
The PROMETHEE Method: The PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) is a multi-criteria decision-making method developed by Brans *et al.* [7, 8]. It is a quite simple ranking method in conception and application compared with other methods used for multi-criteria analysis. It is well adapted to problems where a finite number of alternatives are to be ranked according to several, sometimes conflicting criteria [9]. The evaluation table is the starting point of the PROMETHEE method. In this table, the alternatives are evaluated on the different criteria. The implementation of PROMETHEE requires two additional types of information, namely:

- Information on the relative importance that is the weights of the criteria considered.
- Information on the decision-maker's preference function, which he/she uses when comparing the contribution of the alternatives in terms of each separate criterion. The weights coefficients can be determined according to various methods [10, 11]. SHANNON ENTROPY method is used to determine the criteria weights in this study. The PROMETHEE method is appropriate to treat the multi-criteria problem of the following type:

$$\max \{f_1(\alpha), f_2(\alpha), \dots, f_n(\alpha) | \alpha \in A\}, \quad (1)$$

Where A is a finite set of possible alternatives and f_j denotes n criteria to be maximized. For each alternative, $f_j(\alpha)$ is an evaluation of this alternative. When we compare two alternatives $a, b \in A$, we must be able to express the result of these comparisons in terms of preference. We, therefore, consider a preference function P . The preference function translates the difference between the evaluations of two alternatives (a and b) in terms of a particular criterion, into a preference degree ranging from 0 to 1. Let

Table 1: Generalized criteria (Brans et al. 1984)

Type of generalized criteria	Analytical definition	Shape	Parameters to define
Type I Usual criterion	$H(d) = \begin{cases} 0, & d = 0; \\ 1, & d > 0. \end{cases}$		--
Type II Quasi-criterion	$H(d) = \begin{cases} 0, & d \leq q; \\ 1, & \text{otherwise} \end{cases}$		q
Type III Criterion with linear preference	$H(d) = \begin{cases} \frac{ d }{p}, & d \leq p; \\ 1, & d > 0. \end{cases}$		p
Type IV Level-criterion	$H(d) = \begin{cases} 1, & d \leq q; \\ 1/2, & q < d \leq p; \\ 1, & \text{otherwise} \end{cases}$		q, p
Type V Criterion with linear preference and indifference area	$H(d) = \begin{cases} 1, & d \leq q; \\ \frac{ d - q}{p - q}, & q < d \leq p; \\ 1, & \text{otherwise} \end{cases}$		q, p
Type VI Gaussian criterion	$H(d) = 1 - \exp\{-\frac{d^2}{2\sigma^2}\}$		σ

$$P_j(a,b) = G_j[f_j(a) - f_j(b)] \quad 0 \leq P_j(a,b) \leq 1, \quad (2)$$

The preference function associated to the criterion, $f_j(i)$ where G_j is a non-decreasing function of the observed deviation (d) between $f_j(a)$ and $f_j(b)$. In order to facilitate the selection of specific preference function, six basic types of this preference function are proposed to decision maker by Brans and Vincke [7], as it presented in table 1.

In each case no more than two parameters (threshold, q , p or s) have to fix [12, 13]. Indifference threshold q : the largest deviation to consider as negligible on that criterion. It is a small value with respect to the scale of measurement. Preference threshold p : the smallest deviation to consider decisive in the preference of one alternative over another. It is a large value with respect to the scale of measurement. Gaussian threshold s : it is only used with the Gaussian preference function. It is usually fixed as an intermediate value between indifference and a preference threshold. PROMETHEE permits the

computation of the following quantities for each alternative a and b :

$$\pi(a,b) = \frac{\sum_{j=1}^n w_j P_j(a,b)}{\sum_{j=1}^n w_j} \quad \Phi^-(a) = \sum_{x \in A} \pi(x,a), \quad (3)$$

$$\Phi^+(a) = \sum_{x \in A} \pi(x,a), \quad \Phi(a) = \Phi^+(a) - \Phi^-(a), \quad (4)$$

For each alternative a , belonging to the set A of alternatives, $\pi(a, b)$ is an overall preference index of a over b . The leaving flow $\Phi^+(a)$ is the measure of the outranking character of a (how a dominates all the other alternatives of A). Symmetrically, the entering flow $\Phi^-(a)$ gives the outranked character of a (how a is dominated by all the other alternatives of A). $\Phi(a)$ represents a value function, whereby a higher value reflects a higher attractiveness of alternative a and is called net flow.

The two main PROMETHEE tools can be used to analyze the evaluation problem: (1) the PROMETHEE I partial ranking, (2) the PROMETHEE II complete ranking. The PROMETHEE I partial ranking provides a ranking of alternatives. In PROMETHEE I, alternative a is preferred to alternative b , aPb if alternative a has a greater leaving flow than that of alternative b and a smaller entering flow than the entering flow of alternative b :

$$apb \text{ if } \Phi^+(a) > \Phi^+(b) \text{ and } \Phi^-(a) < \Phi^-(b); \text{ or} \quad (5)$$

$$\Phi^+(a) > \Phi^+(b) \text{ and } \Phi^-(a) = \Phi^-(b); \text{ or} \quad (6)$$

$$\Phi^+(a) = \Phi^+(b) \text{ and } \Phi^-(a) < \Phi^-(b) \quad (7)$$

PROMETHEE I evaluation allows indifference and incomparability situations. Therefore, sometimes partial rankings can be obtained. In the indifference situation (aIb), two alternatives a and b has the same leaving and entering flows:

$$aIb \text{ if: } \Phi^+(a) = \Phi^+(b) \text{ and } \Phi^-(a) = \Phi^-(b) \quad (8)$$

Two alternatives are considered incomparable, aRb , if alternative a is better than alternative b in terms of leaving flow, while the entering flows indicate the reverse:

$$aRb \text{ if: } \Phi^+(a) > \Phi^+(b) \text{ and } \Phi^-(a) > \Phi^-(b); \text{ or} \quad (9)$$

$$\Phi^+(a) < \Phi^+(b) \text{ and } \Phi^-(a) < \Phi^-(b) \quad (10)$$

PROMETHEE II provides a complete ranking of the alternatives from the best to the worst one. Here, the net flow (ϕ) is used to rank the alternatives. The alternative with the higher net flow is assumed to be superior. Since PROMETHEE I does not provide a complete ranking, resulting ranking cannot be compared with the ranking provided by PROMETHEE II. PROMETHEE I ensure creation of indifferent and incomparable alternatives. In some ranking problems, PROMETHEE I can give a complete ranking depending on the evaluation matrix values and, this ranking cannot be different from the one achieved with PROMETHEE II.

Shannon Entropy and Objective Weights: Shannon and Weaver proposed the entropy concept, which is a measure of uncertainty in information formulated in terms of probability theory. Since the entropy concept is well suited for measuring the relative contrast intensities of criteria to represent the average intrinsic information transmitted to the decision maker, conveniently it would be a proper option for our purpose. Shannon developed measure H that satisfied the following properties for all p_i within the estimated joint probability distribution P:

It is proved that the only function that satisfied these properties is:

$$H_{shannon} = -\sum_i p_i \log(p_i) \quad (11)$$

Shannon's concept is capable of being deployed as a weighting calculation method, through the following steps:

Step 1: Normalize the evaluation index as:

$$p_{ij} = \frac{x_{ij}}{\sum_j x_{ij}} \quad (12)$$

Step 2: Calculate entropy measure of every index using the following equation:

$$e_j = -k \sum_{i=1}^m p_{ij} \ln(p_{ij}) \quad (13)$$

$$\text{where } K = (1/n(m))^{-1} \quad (14)$$

Step 3: Define the divergence through:

$$div_j = 1 - e_j \quad (15)$$

The more the div_j is the more important the criterion j th

Step 4: Obtain the normalized weights of indexes as:

$$p_{ij} = \frac{div_j}{\sum_j div_j} \quad (16)$$

RESULTS

Smuggling on its lexicon definition overwhelm in this meaning: a kind of action that occurs illegally and secretly. In smuggling, customs rules and laws are going to violate, so the wrong doer will face the penalty. Smuggling is a kind of transformation that occur secretly and out of the custom's control eyes in order to run away from custom rules. In smugglers executive rules, due to 1312/12/29 material article point and governmental rules of 1350/3/30 material article point and custom dedicated rules of 1374/2/12 point, although using the smuggling term, but it is just a term, a kind of term that is vacuum from any certain and bounded definition on it and of it. The following part is a unit of that definition that had been referred to smuggling already" each secretly action of borders transformation which runout of custom's supervision control. Smuggling is subdivided into two parts, from its nature kinds: from one side smuggler agent may act this by without legal and decided rules of custom and from another side it may done by some fake full documentary in trading that in this condition called semi-smuggling. This study tries to focus on the government economic and how smuggling is going to affects its income of financial.

Good Smuggling Is of Two Kinds:

- Smuggling illegal goods, means those ones that referred forbidden like drug, weapon and alcoholic drinks.
- Smuggling some goods that considered under specific condition and should be supervised for instances, may be a smuggler don't want to pay its custom and legal issues.

Smuggling in its study field focus on the second kinds of definition more than its former one, so smuggling could affect like the following and due to this it's important to study, disorder in economic system, disorder in trading policy, financial disorder, disorder in politic variables performance, reduction of government income, resource allocation digression, reduction of management authority, additionally to mentioned units good smuggling is one of complex and multi-dimensional phenomenon and its influence does not bound on economic only but gets a lot of political, sociological and cultural domain. Also will trace on moral

audaciousness beside its economical one. The most favored reason for good smuggling in maritime borders:

Wide Range of Maritime Borders: One of these aspects is delving to the expanded lines of Persian Gulf and Oman Sea and the existence of rivers, islands and Gulf long borders of seashores that facilitate the ways for the smugglers for easy access to secret transformation.

Shortness of the Path: The shortness of smuggling ways from Arabian countries seashores and Persian Gulf and Islamic republic of Iran's sea lines are another factors of leading smuggling in Iran. This distance is considered the narrowest one on Hormouz strait about 21 mile of sea, Helark island in Oman seashores distance of Sirk port in eastern south of Hormouz until Khasbport of Oman 55 mile of sea and from Helak until Khasb port is 37 mile of sea, that passing by of these paths using fast boats are not take beyond of 1 hour time [14].

Wide Range of the Local Area and Variety of Smuggling Paths: The expansion of goods trafficking in the local area of Persian Gulf is about 239000 square kilometers, these space of huge range of latitude in goods trafficking provide an easy way for smugglers and facilitate the condition for them and pursuantly made the condition more complex for encountering the situation [15].

The Existence of Oil Platforms and Many Islands in Persian Gulf: More than 200 oil platforms and 150 islands are being into case in Persian Gulf. Additionally to these lands there are more or less numerous massive rocks in Oman and the UAE seashores and in the other side Persian Gulf and Oman Sea is one of most trafficking ways [16]. Daily, hundreds of small and big petroleum Trafficking ships are in move in that high trafficking space, also navy arm ships, boats are found it very propitious ways for smugglers. From the other side Arabian countries, in the vicinity of Persian Gulf do not legislating ideal rulsti face the smuggling because the free zones of economics and ports around them are very well formed for their economic and trafficking goods [17].

Ways of Smuggling in Iran's Maritime Borders: Using fast engine boats because of the short distance between Persian Gulf islands and Iran's points areas from

Arabian borders smugglers get easy access to goods trafficking [18]. In free trading zones also these boats have special importance, because this area mean Persian Gulf is one of high trafficking area for shipping and fuel trafficking, so facing and stopping these trafficker is not an easy job. However the most supervision get for trading and travelling ships, an a little or no access is gained toward fishing or small boats. So using these ways considered full of goods and fuel trafficking which goes illegal because it's difficult to control all the passing ships and boats due to high range of transformation in this area for security forces.

Under Covered Goods: Are particular kinds of goods that put into the case, maybe under the other goods in the ship and get the access of the custom and enter to its destination. Step by step this action gets popularity especially in three province of Bushehr, Khuzestan and Hourmozgan. This amount of goods are followed by special rules and in every each place is different, for instances in Daier port, six full Neisan (a brand of carrying car) considered illegal while in Bushehr this amount differ between one to seven Neisan.

Illegal Wharfs: By illegal wharfs we mean a class of wharfs that don't have any official custom to supervise the good. Identifying this wharfs that considered one of the leading ways of goods trafficking is not out of importance. In Bushehr we recognized 50 fishing wharfs only, that none of them are under the custom control. in Hourmozgan again 48 informal wharfs are recognized illegally that they enter goods without formal supervision.

Second Phase: In this phase by using Delphi method and research literature survey we end up with the following strategy for the combating of goods and fuel smuggling in southern maritime borders of the country. Figure 2 present above mentioned.

Third Phase: In this phase strategies and prevention ways are identified and described in Iran's southern maritime borders according to special preventive measures in order to reduce goods and fuel smuggling based on Practicability, implementation costs, time needed for implementation and the efficacy in reducing smuggling by using PROMETHEE and SHANNON ENTROPY methods as followed in the upcoming steps:

Figure 2: identified strategy and decision matrix of PROMETHEE method

Code	Suggested Executive Strategies	Time	Cost	Practicability	efficacy
A1	Facility on investment and shifting toward free trading by expanding business, healthy economic and development of export	3.6	4.5	7.65	5.1
A2	Reduction of time for goods release in custom	3.56	5.6	6.95	6.33
A3	Helping the market for Islamic sharing and stabilizing the economic.	5.3	4.35	5.36	4.95
A4	Identifying smugglers of fuel and goods group and also facing them.	5.23	6.36	6.33	8.23
A5	Retrospect on good trafficking rules and clarifying the trading rules	7.66	8.36	7.56	9
A6	Solving the problem of unemployment in free zone areas and seashores local.	3.6	6.33	8.12	8.99
A7	Mutual cooperation between two neighborhood countries for stopping and facing the smugglers band.	2.15	7.69	7.5	8.79
A8	Change the smuggling to the high risk action by enhancing the sea control	3.65	6.8	7.23	7.65
A9	Enhancing the jobs and work opportunities by tactful and logical policy	4.63	7.25	6.98	6.35
A10	Retrospect in the fuel quotation for shipping.	8.36	8.69	8.96	9.65
A11	Representative should take in charge that distinct the smuggling goods from the formal imported one.	5.23	3.98	7.3	6.55
A12	Watching the informal wharfs and controlling them by official principal	8.66	9.65	9.86	8.96
A13	Assigning some well standardized rules for controlling all trafficking goods over custom.	8.72	9.53	9.77	9.36
A14	Indoctrination the people by not to buy foreign goods and culture them with domestic production buying	7.23	6.75	8.65	9.59
A15	Setting a professional combating group which teamed by custom and maritime experts in order to face good and fuel smuggling in Iran's maritime borders.	9.23	9.25	9.68	9.68
A16	Setting a bank information to notify the ways and factors of good trafficking whether legally or illegally	9.3	9.42	9.78	9.56
A17	Pay attention to domestic production and well qualify them.	5.12	2.89	6.8	8.68
A18	Setting special educational courses for the maritime agents.	9.46	8.95	9.56	9.75
A19	Facilitate the maritime forces by modern and high technology in order to face the problem	9.42	8.95	8.99	9.48

Figure 3:Criteria weight

Time	Cost	Practicability	efficacy
0.22	0.23	0.25	0.3

Table 3:partial ranking andcomplete ranking (PROMETHEE flows)

Alternative	F+	F-	F	Ranking
A16	0.72204	0.01604	0.70600	1
A15	0.72083	0.02316	0.69768	2
A18	0.72338	0.03800	0.68538	3
A13	0.68492	0.05968	0.62524	4
A19	0.65638	0.09191	0.56448	5
A12	0.66335	0.10826	0.55509	6
A10	0.63330	0.15682	0.47648	7
A14	0.52438	0.29446	0.22992	8
A5	0.45021	0.33886	0.11134	9
A6	0.31093	0.47996	-0.16903	10
A7	0.28851	0.54264	-0.25414	11
A4	0.23747	0.63581	-0.39834	12
A9	0.21952	0.64086	-0.42133	13
A8	0.21376	0.63849	-0.42473	14
A17	0.19502	0.64047	-0.44546	15
A11	0.16748	0.68098	-0.51349	16
A2	0.12125	0.74289	-0.62164	17
A1	0.10919	0.76436	-0.65517	18
A3	0.09072	0.83900	-0.74828	19

Table 4: Parametric Table

Function	Linear Time	Linear Cost	Linear Practicability	Linear efficacy
q-indif	1	1	1	1
p-abs-pref	1	1	1	1
sigma	1	1	1	1

First Step: In this step all of those above mentioned Criteria such asPracticability, implementation costs, time needed for implementation and the efficacy in reducing smuggling have been prioritized by use of Shannon Entropy method, figure 3.

Second Step: In this above mentioned strategy for sea trafficking reduction and also their Practicability, implementation costs, time needed for implementation and the efficacy in reducing smuggling using 1 to 9 scales are marked and their results are conducted by PROMETHEE method of matrix as represented on Table 2. Then by applying PROMETHEE method, positive prominent outside stream and negative prominent outside stream and pure one are calculated for each of parameters as shown on table no 3 and due to them, their preference have been prioritized. And also parametric table presented in table 4.

CONCLUSION

This study conducted in three phase in order to reduce and combat the growth of goods and fuel smuggling in southern part of the maritime borders in Iran, so in the first phase we delved into the smuggling phenomenon and its main reasons and ways for that directly, then the study move to identifying the Executive Strategies for combating Goods and fuel smuggling by use of Delphi method and survey of research literature in the second phase, at last, in the third phase identified Executive Strategies for combating Goods and fuel smuggling have been prioritized according to the Criteria such as Practicability, implementation costs, time needed for implementation and the efficacy in reducing smuggling by using PROMETHEE method and Shannon Entropy.

Final result of PROMETHEE method revealed that Respectively following strategy, A16 “Setting a bank information to notify the ways and factors of good trafficking whether legally or illegally”, A15 “Setting a group included by custom and maritime experts in order to face good smuggling”, A18 “Setting special educational courses for the maritime agents”, A13 “Assigning some well standardized rules for controlling all trafficking goods over custom” A19 “Facilitate the maritime forces by modern and high technology in order to face the problem” Respectively got the highest and Respectively following strategy A3 “Helping the market for Islamic sharing and stabilizing the economic”, A1 “Facility on investment and shifting toward free trading by expanding business, healthy economic and development of export”, A2 “Reduction of time for goods release in custom”, A17 “Pay attention to domestic production and well qualify them” gets the least priority over the other suggested strategy.

REFERENCES

1. Bhagwati, J. and B.A. Hansen, 1973. Theoretical Analysis of Smuggling. Quarterly Journal of Economics, 87: 17-26.
2. Buonanno, P., 2004. The Socioeconomic Determinants of Crime. A Review of the Literature. Universitadegli Studi di Milano-Bicocca. Italy.
3. Mir Mohammad, S.M., 2003. Interaction of the underground economy and economic security. Supreme National Defense University, Tehran, Iran (In Persian).

4. Yavari, K., 2008. Estimate exponentially expensive imports, smuggling and use of statistical differences, Proceedings of the Third Conference of the phenomenon and ways to prevent smuggling, Tehran University (In Persian).
5. Arab MazarAhmadi, A., 2003. Size of the black economy. Tabatabai University, Tehran, PhD Thesis (In Persian).
6. Shariat, J. and A. Eyoukhani, 2008. Good smuggling through sea and compared it toward land smuggling. Proceedings of the Third National Conference of the phenomenon of smuggling and ways to prevent it, Tarbiat Modarres University, Tehran (In Persian).
7. Brans, J.P. and P.H. Vincke, 1985. A preference ranking organization method. *Management Science*, 31: 647-656.
8. Brans, J.P., P.H. Vincke and B. Mareschall, 1986. How to select and how to rank projects: The PROMETHEE method. *European Journal of Operational Research*, 14: 228-238.
9. Albadvi, A., S.K. Chaharsooghi and A. Esfahanipour, 2007. Decision making in stock trading: An application of ROMETHEE. *European Journal of Operational Research*, 177: 673-683.
10. Nijkamp, P., P. Rietveld and H. Voogd, 1990. *Multicriteria evaluation in physical planning*. Amsterdam: Elsevier Science Publishers.
11. Mergias, I., K. Moustakas, A. Papadopoulos and M. Loizidou, 2007. Multi-criteria decision aid approach for the selection of the best compromise management scheme for ELVs: The case of Cyprus. *Journal of Hazardous Materials*, 147: 706-717.
12. Brans, J.P. and B. Mareschall, 1994. The PROMCALC and GAIA decision support system for multi-criteria decision aid. *Decision Support Systems*, 12: 297-310.
13. Wang, J.J. and D.L. Yang, 2007. Using a hybrid multi-criteria decision aid method for information systems outsourcing. *Computers and Operation Research*, 34: 3691-3700.
14. Sheikh, M., 1974. Smuggling, Production and Welfare. *Journal of International Economics*, 10: 22-35.
15. Pitt, M., 1981. Smuggling and Price Disparity. *Journal of International Economics*, XI: 45-55.
16. Thursby, M., R. Jensen and J. Thursby, 1991. Smuggling, Camouflaging and Market Structure. *Quarterly Journal of Economics*, 108(4): 22-36.
17. Norton, D., 1988. On the Economic Theory of Smuggling. *Economica*, 55(1): 71-85.
18. Schnider, F. and D. Enste, 2000. Shadow Economy: Sizes, Causes and Consequences. *The Journal of Economic Literature*, 38(1): 72-81.