Iranian Journal of Management Studies (IJMS)
Vol 3. No.3. January 2010 pp: 41- 58

Evaluation of the strategies of target market selection on the basis of IFE and EFE matrixes using linmap technique (A case study of Bushehr province)

***Hamid Shahbandarzadeh*[*1], *Fatemeh Haghighat*[2]**

1. Assistant Professor of Industrial Management, Persian Gulf University
2. MSC of Industrial Management, Persian Gulf University

Abstract

One of the most important requirements of developing appropriate strategies for international marketing is correct identification of target markets. Using quantitative techniques and decision making skills will lead to better results regarding the evaluation of marketing strategies. In this study, first we have used internal factor evaluation (IFE) matrix for recognizing and comparing strengths and weaknesses (internal factors) of Bushehr export companies regarding participation in their target markets and then we have used external factor evaluation (EFE) matrix for recognizing and comparing opportunities and threats (external factors).

As the effective criteria have been categorized in this four level (strengths, weaknesses, opportunities and threats), we have used LINMAP technique separately for each level and at last we've unified the results of each level by using of Borda method.

The findings of this study help decision-makers of international trading to investigate the results of their decisions in a more logical and efficient way.

Key words:

International marketing strategies, IFE matrix, EFE matrix, LINMAP technique, Borda method

[*]. Corresponding Author , Tel: 09123396721 **Email**: Shahbandarzadeh@pgu.ac.ir

Introduction

Companies are forced to develop and follow strategies for international activities so that they can expand their activities and get more target share. Probably, the greatest advantage of these strategies is that companies can find new costumers for their products and services and thereby increase their sales.

International market selection (IMS) is the first and most important step in export strategy (Root, 1994), making it a critical success factor for both smaller exporters and mature multinational firms.

IMS aims to determine the relative attractiveness of markets within a specific set, prior to the final in-depth assessment of the most appealing one(s) for expansion. IMS is an element of operations that firms need to setu up. However it remains difficult and contentious because of "the bewildering array of countries and markets throughout the world…". Among others, Ayal and Zif (1978) and Chetty and Hamilton (1993) stress that effective market choice is a strategic decision that affects export performance.

The organizations which expand their activities across national borders are called international or multinational companies. Multinational companies are faced with numerous local opportunities and threats from social, cultural, political, legal, and technological aspects, and regarding the ever-increasing variety of products and geographical areas, their number and complexity increases significantly.

There is no doubt that presence of factors such as geographical distance, cultural differences, and various trading and marketing methods makes the development and administration of marketing strategies more complex for this kind of companies. Considering this problem, the necessity of investigating the factors affecting these strategies becomes clearer.

Literature Review

The literature on International Market Selection (IMS) contains many proposed models which make significant contributions.

Papadopoulos et al. (1988) propose a new tradeoff model that uses two key constructs, demand potential and trade barriers, as well as firm strategy as a contingency construct. Each key construct is measured by only four variables, resulting in simplicity and low application cost, and strategy is used to develop weights for the variables.

Brouthers et al. (2009) develop a model of international market selection that adds firm-specific advantages and transaction cost considerations to previously explored target market factors based on Dunning's Eclectic Framework. Results obtained using neural network analysis indicates that this model has strong predictive power in explaining international market selection.

Westhead et al. (2002) explore the differences between micro and small firms with regard to the decision to sell goods or services abroad. This survey gather information on the propensity to export goods or services abroad and the mode of export behaviour reported by established 'micro' as well as 'small' firms. The performance of exporting and non-exporting firms is also compared.

Brewer (2001) develops a theory that firms seek out new country markets on the basis of expected commercial returns. These expectations depend on judgements about the attractiveness of the market and the firm's competitive position in it, which in turn are influenced by informants. The research investigates the manner in which Australian firms, already involved in international business, make international market expansion decisions. In addition, it covers country market selection without regard to the mode of entry selected by the firm.

Methodology

In the present study the emphasis is on the necessity of evaluating and prioritizing international marketing strategies of export companies in Bushehr Province on the basis of their target markets. Export companies in Boushehr possess various target markets, the most important of which include: Ukraine, Italy, Spain, India, Malaysia, and United Arab Emirates. IFE matrix and EFE matrix have been used for each of these markets in order to identify Strength, weakness, opportunity and threat points.

In this study, different attributes have been identified for the investigation of opportunities and threats existent in each of these target markets and the weaknesses and strengths of export companies of Boushehr p rovince, the most important of which have been selected. It should be noted that for each internal and external factor, especial attributes were defined. The opportunities factor includes for attributes of cultural congruence, population of target country, economical growth, and amount of access to distribution factors, while the factor of threat encompasses three attributes of import tariffs and limitations, distance, and presence of

competitors. Also, two attributes were determined for strength points which include the value of non-oil exports and familiarity of exporters with target countries. The attributes defined for weaknesses are deficiencies in communication, weak advertising tools, and weak political relations. Then, IFE matrix and EFE matrix were used for prioritizing each of target markets. Since these methods require exact determination of attributes' weighs, LINMAP technique was used to evaluating the importance of each of these attributes in a scientific way. As for each level we obtained different result, we used Borda method to unify the results of each level and providing final grading. Figure 1 shows the conceptual framework of the research.

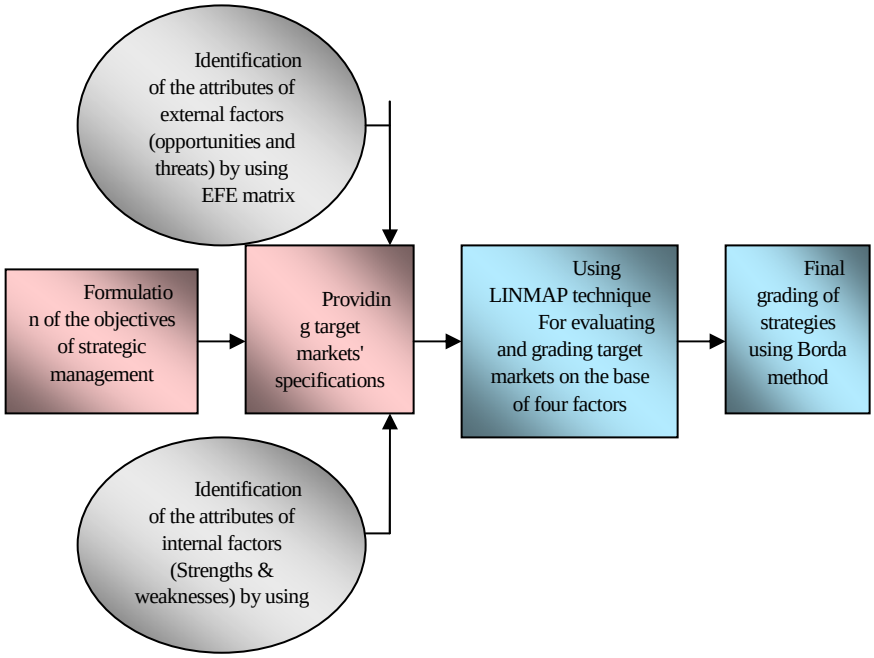

Figure 1: conceptual model for evaluation of target markets

Strategic planning of international marketing

There are numerous variables in the field of marketing which can influence success and failure of the strategies. One of these strategies is partitioning target markets. Partitioning markets means dividing costumers into especial groups on the basis of their purchasing habits and needs. For the purpose of partitioning the market and evaluating the potential of these

sections, strategists have to identify costumers' characteristics and needs, investigate their differences and commonalities, and draw a figure of consumer groups (Brouthers, Mukhopahdhyay, 2009).

Target markets of Bushehr export companies were divided into six countries in this research which can be compared on the basis of their opportunities and threats attributes. Meanwhile, some attributes regarding the strength and weakness points of Bushehr export companies have been defined which contribute to comparison of their strength and weakness points in target markets. It is worth mentioning that each of these general attributes consist of some sub-attributes which have been mentioned earlier. The objective of strategic planning - selection of the best marketing strategy can be achieved after the comparison of above-mentioned attributes. Marketing strategies are also defined in each of target markets. The hierarchical structure of the above model is presented in figure 2. Objective, attributes and sub-attributes, and finally marketing strategies are presented at the first, second, third, and fourth levels, respectively.

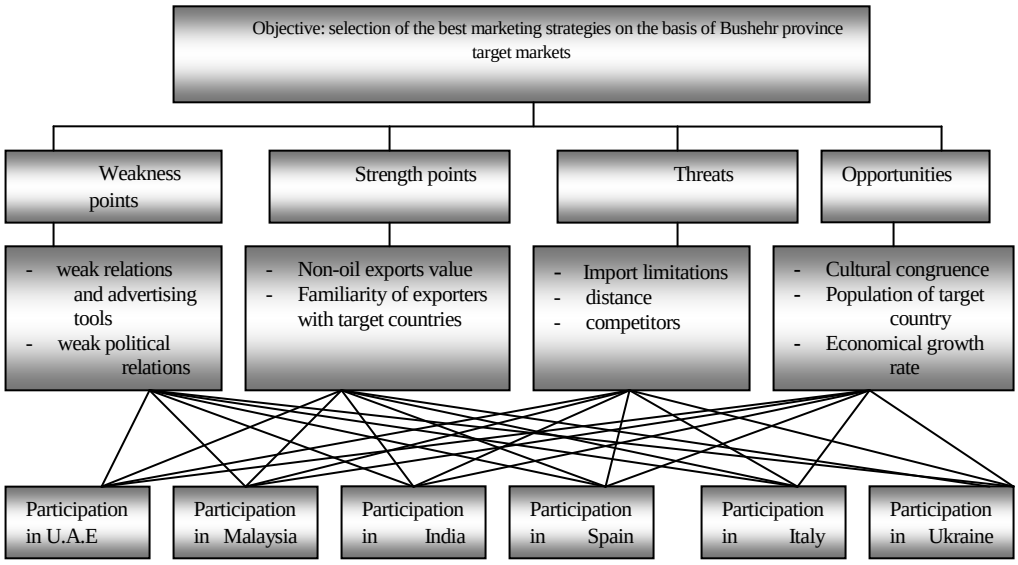

Figure 2: Hierarchical Structure of Strategic Planning Model of Marketing

In decision-making process, after specifying strategies and the influencing attributes, strategies are prioritized and the best possible strategy is selected. There are various methods for evaluating and prioritizing strategies, one of which is making use of IFE and EFE matrixes.

Using IFE and EFE matrixes in order to evaluating internal and external factors

Managers and strategists can evaluate internal factors (Strengths, weaknesses) and external factors (opportunities and threats) by using of IFE matrix and EFE matrix, respectively. After identifying quadruplet factors by using of these matrixes, a weight has been allocated to each of these factors and they have been prioritized regarding their weights.

As the way of weighting and prioritizing in these methods (IFE matrix and EFE matrix) is not a precise way, therefore, in order to remove this problem, LINMAP technique is used in this research for providing the weighs of the attributes and prioritizing alternatives in a scientific way. In this regard, each of the sub-attributes related to opportunities and threats, strength and weakness points were modeled and then by combining the results of the four models through Borda method, the final grading of the alternatives were achieved.

LINMAP technique

LINMAP technique was developed by Shocker and Srinivasan (Shocker, Srinivasan, 1973) for evaluating alternatives excluding weights of attributes (from out of model) and finding an ideal solution. LINMAP is a linear programming model for estimating coordinates of an ideal point which is mostly based on the preferences of decision maker. In this method, weights are located in Euclidian distance measure and multidimensional space within the specified decision matrix (Alaomar, Raid, 2002). Hwang and Yoon (Hwang, Yoon, 1981) state that LINMAP technique does not need a collection of organized comparisons which include all paired comparisons on the side of decision maker. The main advantage of LINMAP was expanded by Green and Srinivasan (Green, Srinivasan, 1978) and Srinivasan et al. (Srinivasan, Jain, Malhotra, 1985). Other advantages of this approach in relation to linear programming which were associated with its flexibility of were introduced by Malhotra (Malbotra, 1982). Toubia et al. (Toubia, Simester, Hauser, 2001) provided and tested new joint analytical methods which were used for reducing accountability load of comparisons and increasing accuracy. They noticed that in real life problems, error probability in respondent replies should be paid attention.

Erensal and Albayrak (Erensal, Al bayrak, 2006) introduced a framework for evaluation and selection of knowledge management tools and technologies. Using

information related to alternative priorities, they investigated Fuzzy Leaner Programming (FLP) technique for Multi Attribute Group Decision Making (MAGDM) problems. In order to reflect decision maker's subjective preferences and determine weight vector of attributes, they used linear programming technique (LINMAP) for multidimensional analysis of priorities. Shocker and Srinivasan (Shocker, srini vasan, 1974) introduced an analytical approach to predict costumers' desires for purchasing different brands in the market of the same product together with a search procedure for specifying optimal ideals of a new product. They used LINMAP technique for determining optimal point and outstanding weights for characteristics of each period.

Li (Li, 2008) expanded LINMAP technique in order to develop a new methodology for solving Multi Attribute Decision Making problems (MADM) in Atanassov's intuitionistic fuzzy (IF) environment. In that methodology, Atanassov's collections use an IF decision matrix for describing fuzziness of decision information and decision making processes. Using this approach, each alternative is evaluated on the basis of its distance with Atanassov's IF positive ideal solution (IFPIS). Then, Atanassov's IFPIS and the weights of features are estimated using a new linear programming model and based on determined consistency and inconsistency attributes. Finally, the distance of each alternative to Atanassov's IFPIS is measured for grading the alternatives. In the above methodology, Xia et al. (Xia, Wang, 2006) used a Fuzzy Positive Ideal Solution (FPIS) instead of IFPIS for evaluation alternatives.

Li and Sun (li, sun, 2007) also developed a FLINMAP[1] for MAGDM problems which was associated with conceptual (linguistic) variables and incomplete preference information. Wittinik and Cattin (Wittink, cattin, 1981) employed four methods for estimating alternatives for joint analysis and their results indicated that LINMAP has the best predictive ability for models of stable characteristics. Shadi-nezhad and Akhtari (Shadi-Nezhad, Akhtari, 2008) investigated a probabilistic model of multidimensional analysis of preferences (LINMAP). This model evaluates fuzzy weights and finding ideal solution together with fuzzy decision making preferences and fuzzy decision making matrix. All information of the model, were assumed under Triangular Fuzzy Numbers (TFNs). The above-mentioned approach

1 Fuzzy Linear-Programming for multidimensional analysis of preference

was expanded for group decision making environments and simulated the problem as a probabilistic programming problem with multiple objectives.

In LINMAP method, a collection of *m* alternatives $A=\{A_{1,...}A_m\}$ which consist of a collection of *n* attributes $C=\{C_{1,...,}C_n\}$ are assumed as a point in a multidimensional space. Then, the ideal point is identified and the alternative with the shortest distance from the ideal point is selected (Shadi-Nezhad, Akhtari, 2008).

It is assumed that the decision maker, from the two alternatives, will select the one with the shortest distance to the ideal point. The distance from the ideal point is considered as the weighted Euclidian distance (d_i) for the alternative A_i. Also, W_j weights are considered in order to change the present measures into the same measures. Meanwhile, they show the importance of each attribute. The distance of the alternative A_i from the ideal point is defined as:

$$d_i = \left\{ \sum_{j=1}^{n} w_j \left(r_{ij} - r_j^*\right)^2 \right\}^{0.5} \quad ; i = 1,2,\dots,m \qquad (1$$

Where r_j^* shows the ideal form the jth attribute (Shadi-Nezhad, Aktari, 2008).

As Hwang and Yoon [8] pointed out, the final LINMAP model is defined on the basis of the equation 2:

$$MinB = \sum_{(k,l)\in\Omega} \max\left\{0,(S_k - S_l)\right\} \quad s.t. \sum_{(k,l)\in\Omega} (S_l - S_k) = h \qquad (2$$

In this model, $S_i = d_i^2$ and *B*= lack of fitness and *h* is a fixed optional number. They rewrote the above equation as a LP model as the following:

$$Min \sum_{(k,l)\in\Omega} \lambda_{kl}$$

$$s.t:$$

$$(S_l - S_k) + \lambda_{kl} \geq 0 \qquad for \ (k,l)\in\Omega \qquad (3$$

$$\sum_{(k,l)\in\Omega} (S_l - S_k) = h$$

$$\lambda_{kl} \qquad for \ (k,l)\in\Omega$$

If we replace $S_i\ d_i^2$ in equation 1, the classic LINMAP model is presented as equation 4 (hwang, Yoon, 1981).

$$Min \sum_{(k,l)\in\Omega} \lambda_{kl} \quad s.t.: \sum_{j=1}^{n} w_j \left(X_{lj}^{2} - X_{kj}^{2}\right) - 2\sum_{j=1}^{n} v_j \left(X_{lj} - X_{kj}\right) + \lambda_{kl} > 0 \quad for\,(k,l)\in\Omega$$

$$\sum_{j=1}^{n} w_j \sum_{(k,l)\in\Omega} \left(X_{lj}^{2} - X_{kj}^{2}\right) - 2\sum_{j=1}^{n} v_j \sum_{(k,l)\in\Omega} \left(X_{lj} - X_{kj}\right) = h \qquad (4$$

$$w_j, \lambda_{k,l} \geq 0$$

v_j : Unrestricted

After solving this linear programming model, the answer of $\left(w, a^*\right)$ can be found using equation 5. They also pointed out that it is possible to have four answers to LP and ideal point of a^* :

1) If $W_j^* > 0$ then $a_j^* = V_j^* / W_j^*$

2) If $W_j^* = 0$ and $V_j^* = 0$, $a_j^* = 0$ is defined (5

3) If $W_j^* = 0$ and $V_j^* > 0$, then $a_j^* = +\infty$

4) If $W_j^* = 0$ and $V_j^* < 0$, then $a_j^* = -\infty$

Using LINMAP technique for evaluating the importance of attributes and prioritizing alternatives

In this study, LINMAP technique was used in order to evaluate the importance of Attributes and prioritize IFE and EFE matrixes. The main reason for using this technique was that this method considers both real data (decision making matrix) and paired comparisons simultaneously. It does not require compatibility of decision maker's statements and has the ability to identify the ideal alternative in incompatible situations. In this study, first, the real data and information for each country were collected and organized in the four decision matrix for each factor relating to opportunities, threats, weakness and strength points. The above data were collected on the basis of experts' ideas and documents, too. They are presented in tables 1-4. Then, experts were asked to state their views about each country (alternatives) on the basis of the attributes indicated in the tables. One of the advantages of LINMAP is that it does not require compatibility for paired comparisons. Therefore, in this study, because of some incompatibilities in views and paired comparisons of decision makers, using this technique was preferred to other techniques. It should be mentioned that LINMAP method does not

require normalizing the data. However, in order to get better results, data of the tables were normalized using Norm method. After modeling, four matrices were achieved using LINMAP and solving thereof by means of practical software WINQSB.

For each model, the alternatives were graded and the importance of attributes was estimated. In fact, another advantage of LINMAP technique is that it grades the alternatives without inputting W_j from out of the problem. In this study, since different grades are achieved for each of the factors opportunities, threats, and strength and weakness points, decision making becomes a difficult process. In order to solve this problem, Borda technique is used in order to combine the results and providing final grading. This process will be explained in the next section.

The following matrixes are formed on the basis the data available in the documents and province trade organization as well as experts' ideas. Data of table 1 are related to the four basic attributes of opportunities factor, which is considered as one of the strategic factors of EFE matrix. Judgments related to the decision maker are presented under this matrix. Decision maker's preferences are defined on the basis of (k, l) which shows priority of k in relation to l.

Table 1. Decision making Matrix of Marketing Strategies on the Basis of Opportunities Attributes and Paired Comparison of Decision makers

Attributes / Alternatives	Cultural congruence	Population of the target country (million)	Percent of economical growth rate (2005)	Access to distributional factors
Participation in Ukraine Market	4	51.8	5.5	3
Participation in Italy Market	5	57	.2	7
Participation in Spain Market	5	42.7	3.2	5
Participation in Indian Market	5	1045.8	7.1	5
Participation in Malaysia Market	7	23.2	5.5	7
Participation in U.A.E Market	8	3.44	7.3	8

S= {(1, 2), (3, 1), (4, 1), (5, 1), (6, 1), (2, 3), (4, 2), (5, 2), (6, 2), (4, 3), (5, 3), (6, 3), (5, 4), (4, 6), (6, 5)}

In the matrix presented in Table 2, three attributes of threats have been considered as one of the factors of EFE matrix. Paired judgments of decision maker are also presented under this matrix.

Table 2. Decision making Matrix of Marketing Strategies on the Basis of Threats Attributes and Paired Comparison of Decision Makers

Attributes / alternatives	Import Limitations	Distance	Competitors
Participation in Ukraine Market	4	2574.37	4
Participation in Italy Market	7	3703.49	3
Participation in Spain Market	5	5113.14	4
Participation in Indian Market	6	2733.18	5
Participation in Malaysia Market	7	7006.42	5
Participation in U.A.E Market	9	894.30	6

S= {(2, 1), (1, 3), (4, 1), (5, 1), (6, 1), (3, 2), (4, 2), (2, 5), (6, 2), (4, 3), (5, 3), (6, 3), (4, 5), (6, 4), (6, 5)}

Table 3 is prepared in relation to two attributes of strength factors as one of the factors of IFE matrix. In this matrix, subjective judgments of decision maker about competitor alternatives for strategic decision making in relation to target markets are presented.

Table 3. Decision making Matrix of Marketing Strategies on the Basis of strengths Attributes and Paired Comparison of Decision Makers

Attributes / alternatives	Value of Iranian non- oil exports to target countries in 2005 (1000$)	Familiarity of exporters with target countries
Participation in Ukraine Market	41566	4
Participation in Italy Market	236934	5
Participation in Spain Market	146547	4
Participation in Indian Market	2189	6
Participation in Malaysia Market	17844	7
Participation in U.A.E Market	2075000	7

S= {(2, 1), (3, 1), (4, 1), (5, 1), (6, 1), (2, 3), (2, 4), (5, 2), (6, 2), (4, 3), (5, 3), (6, 3), (5, 4), (4, 6), (6, 5)}

In the matrix presented in Table 4, two attributes of marketing weakness points factor as one of the factors of IFE matrix. Decision makers paired comparisons are also provided together with matrix. For each of the above matrixes, particular results have been achieved that are combined with each other. The outcomes of this process are presented in the next section.

Table 4. Decision making Matrix of Marketing Strategies on the Basis of Weaknesses Attributes and Paired Comparison of Decision Makers

Attributes / alternatives	Weak communicative and advertising tools	Weak political relations
Participation in Ukraine Market	4	3
Participation in Italy Market	3	4
Participation in Spain Market	2	3
Participation in Indian Market	5	6
Participation in Malaysia Market	7	8
Participation in U.A.E Market	6	8

S= {(2, 1), (1, 3), (4, 1), (5, 1), (6, 1), (2, 3), (4, 2), (5, 2), (6, 2), (4, 3), (5, 3), (6, 3), (4, 5), (6, 4), (5, 6)

Combination of the results by using Borda method for final grading

As we mentioned earlier, it is necessary to combine the grading results in each quadruplet models (opportunities, threats, and strengths and weaknesses models) in order to facilitating the decision making process and providing the last results. For this purpose, we used Borda method. In this method, priority of each alternative has been compared in those quadruplet models.

If in paired judgment of an alternative regarding other alternatives, there was a majority amount, then we show this manner by M character, otherwise, in the manner in which there wasn't majority amount or the amounts are even, we code this manner by character of X. the M character shows the priority of row in relation to column and the X character implies the priority of column in relation to row. The way of prioritizing in this

method is on the base of the majority of M character in a row (Momeni, Mansur, 2006).

So by using this method, six countries- as the alternatives- have been compared with each other on the base of their grades in the quadruplet models. The result of this method is presented in table 5.

Table 5. Comparing the alternatives on the base of majority rule in Borda method

	Participation in Ukraine Market	**Participation in Italy Market**	**Participation in Spain Market**	**Participation in Indian Market**	**Participation in Malaysia Market**	**Participation in U.A.E Market**	$\sum C$
Participation in Ukraine Market	-	***X***	***X***	***X***	***X***	***X***	**0**
Participation in Italy Market	***M***	-	***M***	***X***	***X***	***X***	**2**
Participation in Spain Market	***X***	***X***	-	***X***	***X***	***X***	**0**
Participation in Indian Market	***M***	***M***	***M***	-	***X***	***X***	**3**
Participation in Malaysia Market	***M***	***M***	***M***	***M***	-	***X***	**4**
Participation in U.A.E Market	***M***	***M***	***M***	***M***	***M***	-	**5**

Therefore, by using of this method, the last grading was achieved as below:

U.A.E market > Malaysia market > India market > Italy market > Spain and Ukrine markets

So, according to the above results, the strategy of participation in U.A.E market is considered as the best one and investment in this market is preferred. Of course, the distance of this alternative is very short in comparison to Malaysian market, therefore, Malaysian market has similar situation to U.A.E market. But Spain and Ukrine markets have less atteractivness for Boushehr's export companies.

Discussion and conclusion

In this research, international marketing strategies of Boushehr province according to the variability in target markets have been considered. The marketing strategies were defined on the basis of participation in six target markets of Bushehr exports. Each of the markets was investigated in terms of four general attributes of opportunities, threats, weakness and strength points, and the sub-attributes thereof by using of IFE and EFE matrixes. Then, LINAMP technique was employed for investigation and gradation of the above mentioned strategies. One of the main reasons of using LINMAP technique is that it simultaneously considers decision making matrix and decision maker's ideas in the format of paired comparisons. Therefore, this technique is preferred to other similar techniques. Furthermore, this technique does not require normalizing data and consistency of paired comparisons. These factors also lead to prefer ability of this technique to others. At last, the results of each model were combined by using Borda technique and final grading was achieved.

By using these methods, Emirates and Malaysia were the most appealing markets, respectively. Considering commercial records and conditions, it can be argued that historical data also explain efficiency and effectiveness of having relationship with these countries. Regarding the success of quantitative modeling in analyzing priorities in target markets of Bushehr trading system, it is hoped that better decisions be made in all ports and free areas of the country –Iran– . This can pave the way for utilizing combinational model of LINMAP and Borda techniques for comparing all trading parties of Iran.

References

1. Root, F. R. (1994), *"Entry strategies for international markets"*, Lexington, MA: Lexington Books.
2. Papadopoulos, N., Chen, H., Thomas, D.R., (2002), *"Toward a tradeoff model for international market selection"*, International Business review, Vol. 11, pp. 165–192.
3. Reid, S. (1981), *"The decision-maker and export entry and expansion"*. Journal of International Business Studies, Fall, pp. 101–112.
4. Kay, J. (1993), *"The foundations of corporate success"*, New York: Oxford University Press.
5. O'Farrell, P., & Wood, P. (1994), *"International market selection by business service firms: key conceptual methodological issues"*, International Business Review, Vol.3, No. 3, pp. 243–261.
6. Papadopoulos, N., & Denis, J. (1988), *"Inventory, taxonomy and assessment of methods for international marketing selection"*, International Marketing Review, Vol.5, No. 3, pp.38–51.
7. Douglas, S., Craig, C., & Keegan, W. (1982), *"Approaches to assessing international marketing opportunities for small and medium sized companies"*, Columbia Journal of World Business, Fall, pp.26–32.
8. Ayal, I., & Zif, J. (1978), *"Competitive market choice strategies in multinational marketing"*, Columbia Journal of World Business, Vol.13, Fall, pp. 72–81.
9. Chetty, S. K., & Hamilton, R. T. (1993), *"Firm-level determinants of export performance: A meta-analysis"*, International Marketing Review, Vol.10, No. 3, pp. 26–34.
10. David, F.R., (2001), *"Strategic Management"*, Concepts and Cases, fifth Edition, Prentice Hall, New York.
11. Brouthers, L.E., Mukhopadhyay, S., Wilkinson, T.J., Brouthers, K.D. (2009), *"International market selection and subsidiary performance: A neural network approach"*, Journal of World Business, Vol. 44, pp. 262–273.
12. Westhead, P., Wright, M., Ucbasaran, D. (2002), *"International market selection strategies selected by 'micro' and 'small' firms*", Omega 30, pp. 51–68.

13. Brewer, P. (2001), "*International market selection: developing a model from australian case studies"*, International Business Review, Vol.10, pp. 155–174.
14. Shocker, A.D., Srinivasan, V. (1973), "*Linear programming techniques for multidimensional analysis of preferences*", Psychometrika, Vol. 38, pp. 337–469.
15. Al-aomar, Raid, "*A robust simulation-based multicriteria optimization methodology*", Proceedings of the 2002 Winter Simulation Conference.
16. Hwang, C.L., Yoon, K. (1981), "*Multiple attribute decision making methods and applications*", Springer–Verlag.
17. Green, P.E., Srinivasan,V. (1978), "*Conjoint analysis in consumer research: issues and outlook"*, Journal of Consumer Research, Vol.5 (September), pp. 103-23.
18. Srinivasan, V., Jain, A.K., Malhotra, N.K. "*Improved predictive power of conjoint analysis by con- strained parameter estimation*", Journal of Marketing Research, Vol.20, pp.433-438.
19. Malhotra, N.K. (1982), "*Structural reliability and stability of nonmetric conjoint analysis*", Journal of Marketing Research, Vol. 19, pp. 199-207.
20. Toubia, O., Simester, D.I., Hauser, J.R. (2001) "*Fast polyhedral adaptive conjoint estimation, draft for limited distribution"*, mitsloan.mit.edu/virtual_customer.
21. Erensal, Y.C., Albayrak, Y.E. (2006), "*A problem solving perspective on evaluating knowledge management technologies: using fuzzy linear programming technique for multiattribute group decision making with fuzzy decision variables",* Technology Management for the Global Future.
22. Shocker, A.D., Srinivasan, V., (1974) "*A consumer-based methodology for the identification of new product ideas*", Management Science, No. 6, Application Series, pp. 921-937.
23. Li, D.F. (2008), "*Extension of the LINMAP for multiattribute decision making under Atanassov's intuitionistic fuzzy environment*", Fuzzy Optimization and Decision Making, Vol. 7, pp. 17–34.
24. Xia, H.C, Li, D.F, Wang, J.M. (2006*), "Fuzzy linmap method for multiattribute decision making under fuzzy environments"*, Journal of Computer and System Sciences, Vol. 72, Issue 4, pp. 741-759.

25. Li, D.F., Sun, T. (2007), *"Fuzzy linmap method for multiattribute group decision making with linguistic variables and incomplete information*", international journal of uncertainty, fuzziness and knowledge-based systems, No.2, pp. 153- 173.
26. Wittink, D.R., Cattin, P. (1981) *"Alternative estimation methods for conjoint analysis: a Monte carlo study"*, Journal of Marketing Research, Vol. 18, No. 1, pp. 101-106, 1981.
27. Sadi-Nezhad, S., Akhtari, P. (2008) *"Possibilistic programming approach for fuzzy multidimensional analysis of preference in group decision making*", Applied Soft Computing.
28. Momeni, Mansur, (2006), *"New Topics in Operations Research"*, fifth Edition, University of Tehran.