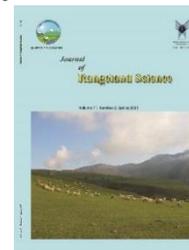




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Research and Full Length Article:

Development of Operational Strategies for Branding *Ferula assa-foetida* L. Medicinal Plant (Case study: Rangelands of Kerman Province, Iran)

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Abstract. Kerman province has a high ranking in terms of the area of the medicinal herb *Ferula assa-foetida*; a species of Umbelliferae family. The oleo-gum-resin is extracted from its roots and used in medicine and industry. It has a great economic value for beneficiaries and exporters. As branding is one of the important issues in the field of natural resource economy, the purpose of this study is to evaluate the branding strategies of this medicinal plant using SWOT (- Strengths, Weaknesses, Opportunities and Threats) technique in Kerman province, Iran. In this regard, a random sample of 19 experts working in this field was obtained. The necessary data were collected by interviewing and completing the questionnaire in the summer of 2017. After identifying the strengths, weaknesses, opportunities and threats of *Ferula assa-foetida* branding, strategies were formulated using Analytical Network Process (ANP) technique to determine their weights. The results showed that Kerman province is in Strength-Opportunity (SO) situation in terms of branding potential. Therefore, in line with this situation, five strategies and nine operational plans were identified and prioritized based on the marketing mix elements (4Ps, Product, Price, Place and Promotion) and using the Analytical Hierarchy Process (AHP) technique, respectively. Price and product strategies are considered more significant than place and promotion strategies. The operational price program of imitating the model of successful countries in the field of processing, pricing and branding of medicinal herb (with the weight of 0.337) was considered by experts as the first priority. Therefore, making the studies target to utilize natural situations properly, sweet and bitter type of operation, and resistance to pests and diseases of this medicinal plant under the supervision of the Forests and Rangelands Organization of Iran are good solutions for continuous presence in the domestic and foreign markets.

Key words: Medicinal herbs, SWOT Technique, Analytical Network Process (ANP), Analytical Hierarchy Process (AHP)

Introduction

The high capacities of Iran in producing medicinal plants indicate the capability of creating powerful brands. Although little attention is paid to this issue, one of the concerns of the Ministry of Commerce in the Fifth National Economic Development Program is to promote brands in the country; in other words, export excellence with incentive branding policies (Masoomzadeh Zavareh *et al.*, 2013).

Iranian rangelands are homes to many species due to the diversity of climate and different soil characteristics (Hossein Jafari *et al.*, 2018). Kerman; the largest province in Iran with all four seasons has a special status in producing medicinal plants, and has always been a host of useful, sometimes rare, medicinal plants (Porkhaton, 2016).

Ferula assafoetida; a species of the Umbelliferae family is one of the most important medicinal wild plants. The species of *Assa-foetida* include *Ferula assa-foetida*, *Ferula persica*, *Ferula alliacea*, *Ferula foetida* and *Ferula narthex*. *Ferula alliacea* species have been identified in Kerman province. (Hossein Jafari *et al.*, 2018).

Asafoetida, an oleo-gum-resin extracted from the root gland of different *Ferula assa-foetida* is used in different countries for various purposes and has a great economic value for beneficiaries and exporters (Iranshahi and Iranshahi, 2011; Delavar *et al.*, 2014). Iranians call it "Anghuze". Iran and Afghanistan are the habitats of this plant, so it is a rare species (Ghassemi Arian *et al.*, 2017; Eskandari Damaneh and Sharafatmand Rad, 2017). This plant grows in Kerman, Khorasan, Balochistan, Kohgiluyeh and Boyer-Ahmad provinces and southern regions of Iran (Anonymous, 2017).

Ferula assa-foetida grows in mountainous and steppe areas. This plant can grow on poor soils with light texture (Moghaddam and Farhadi, 2015). Given the

lack of water resources in this province, it is a reliable species for the livelihood of the exploiters. Since this plant is native to Iran, it seems to have great potential for branding. Thus, by adopting proper strategies, not only the livelihood of the beneficiaries is promoted by exporting, it could also take an effective step towards removing the heavy dependence of the Iranian economy on the single export product.

In the contemporary world, the owners of goods and services have to create a distinct identity through branding of their products for the presence and success in competitive markets. Branding improves recognition of products (goods and services) by consumers. In this regard, some literatures were reviewed:

Moradi (2008) has studied the role of branding in international marketing performance and showed that brand orientation towards its components and international marketing strategies have had a great effect on the performance of companies in international marketing. Shukla (2012) has mentioned that the branding of agricultural products and using brand name are effective ways of differentiation among the competitors and creating values added in the agricultural sector in India. Branding strategy brings about the relative advantage for Indian farmers, entrepreneurs and exporters in the domestic and global markets. Haimid *et al.* (2012) found that the branding of agricultural products increases the competitive advantage of entrepreneurs in domestic and foreign markets. Minten *et al.* (2013) showed that the value chain of packed agricultural crops with a special trade name has had a 100% growth rate in less than five years in Bihar of India. Masoomzadeh Zavareh *et al.* (2013) have examined the challenges faced by the Saffron industry through SWOT technique, and have offered strategies and plans for branding in the industry. Jahangir (2014)

found that halal food branding is effective in creating a competitive advantage. Koutra *et al.* (2015) showed the role of branding in increasing consumption of sugar, and consequently the sugar beet area under cultivation in Thailand. Khalifa and Abdul Fadeel (2015) have counted a specified brand as one of the most important marketing factors in the process of creating a comparative advantage in domestic and international markets of the textile industry.

Some other studies have focused on operation, trade and the market of medicinal plants in Iran and the world. Karimian *et al.* (2018) have investigated which type of operation leads to less degradation of asafoetida gum resin. Sharifiyan Bahrman *et al.* (2018) specified the strengths, weaknesses, opportunities, and threats exploiting the rangelands of Aqqala city and identified the most important factors using AHP technique. Forouze and Mirdeilami (2018) prioritized businesses related to medicinal plants in Chahar Bagh rangelands of Golestan province using AHP technique. Forouze *et al.* (2019) have investigated the factors affecting the willingness of local communities to produce and grow medicinal plants in Kamalan city of Golestan province. Asghari Mirak and Mohammadzadeh Hesari (2013) studied the commercializing medicinal plants and their challenges and solutions. Results showed one of the best approaches to distance from the single-product economy of oil and its vulnerability results are medicinal and industrial plant export in Iran. Habibi Qahfarakhi (2013) studied the roles of medicinal plants in sustainable agricultural development. They noted that marketing is the main problem in the development of these plants. Jusu and Sanchez (2013) showed that the targeted trade of medicinal plants could be a successful economic strategy in Sierra Leone. Sher *et al.* (2014) analyzed the

market trend of medicinal plants as an economic activity in Pakistan. The results indicated that the development of agricultural activities in medicinal plants, developing a regular plan of cultivation as well as the use of new marketing strategies for the production and export of medicinal plants in Pakistan, is considered as a growth engine and income from medicinal plants business that will enhance its economy. Quiroz *et al.* (2014) specified the medicinal plants and studied the economic value of these plants in Benin in South Africa. Their results also showed that the sale of medicinal plants has a great economic significance for this country, and the medicinal plant trade in Benin is a major driving force in the economy.

Asafoetida is a well-known medicine and condiment. India alone consumes about 70% of the world's products as culinary and medicine as well as re-exports (Shah and Zare, 2014). The asafoetida oleo-gum-resin of Kerman province is mostly bitter and mainly exported to India and Pakistan in bulk (Anonymous, 2017). Although branding creates a competitive advantage for this product, it faces weaknesses and threats. Therefore, considering the benefits of the *Ferula assa-foetida*, which covers some rangelands of Kerman province and provides the livelihood of some villagers, the strengths, weaknesses, opportunities, and threats to its branding, and operational strategies was studied.

Materials and Methods

Case study

Kerman Province with an area of 183,285 km², nearly 11% of the land area of Iran is the largest province in the southeast of Iran (Anonymous, 2005). The *Ferula assa-foetida* habitats of Kerman province are shown in Fig. 1.

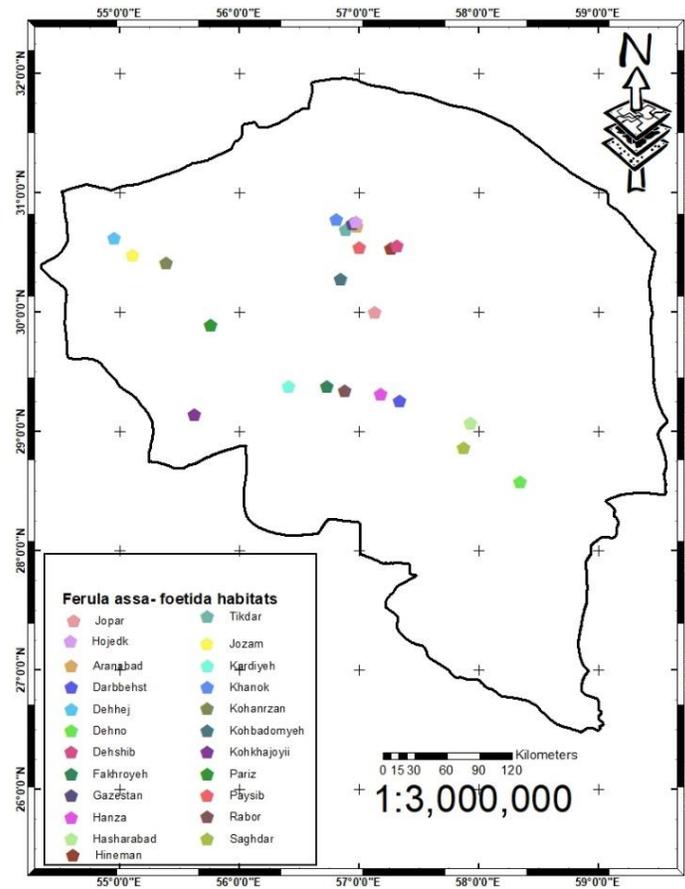


Fig. 1. The location of *Ferula assa-foetida* habitats in Kerman Province

Table (1) shows the natural habitats, harvest rate and the number of exploiters of *Ferula*

assa-foetida in Kerman Province, Iran during 2012-2016.

Table 1. The level of natural habitats, harvesting, and number of *Ferula assa-foetida* exploiters (Source: Department of Natural Resources and Watershed Management of Kerman)

Year	Natural habitats (ha)	Harvest rate (kg)	Number of exploiters
2012	3285	23197	23
2013	2797	25866	27
2014 #	2448	-	-
2015	2290	28445	33
2016 #	1997	-	-
2017*	-	44000	44
2018 #	-	-	-
2019	-	35590	42

#= No permission for exploiting by Kerman Natural Resources Administration

* Statistics for the years 2017-2019 is unpublished.

Methodology

Formulating the strategy for *Ferula assa-foetida* branding in Kerman

Branding is one of the major components of modern marketing alongside the marketing

concept, segmentation, and several others. Most of the branding models share at least two or more of the following dimensions:

- Brand Loyalty, which is explained as a consumers' commitment towards the

brand and repeat purchases of the brand over a period of time.

- Brand Awareness, which refers to the extent of recognition of a brand by its potential customers.
- Brand Associations & other Proprietary Assets—One of the proprietary assets of an organization is the competitive advantage that it has over its competitors. It will help a brand to stay ahead of its current and future competitors and may lead to acquiring a Market Leadership position in the industry.

Perceived Quality, which refers to the quality associations of the brand (Ekhlesi *et al.*, 2016 and Menon, 2016).

One of the best tools in formulating the strategies to determine the branding potential of *Ferula assa-foetida* is SWOT technique. A strategy is a bridge between the external factors; threats and opportunities and the internal factors; strengths and weaknesses. SWOT analysis provides a useful framework for selecting strategies (Badri and Rahbari-Zadeh, 2009; Meredith *et al.*, 2017). Therefore, in the first step, the authors

$$Z = \frac{W - \mu_w}{\delta_w} \quad \text{eq (1)}$$

$$\mu_w = \frac{n(n+1)}{4} \quad \text{eq (2)}$$

$$\delta_w = \sqrt{\frac{n(n+1)(2n+1)}{24}} \quad \text{eq (3)}$$

Where:

Z= Wilcoxon test statistic, μ_w = mean of W and δ_w = standard deviation of W

In the second step, the relative weights of selected internal and external factors are determined by the use of Analytical Network Process (ANP) and Super Decision software (version 2. 6. 0).

In the third step, each factor is given a score of 1 to 4 in terms of its impact on the goal.

identified the strengths, weaknesses, opportunities, and threats facing asafetida branding and then, the experts assessed their importance in the range of 1-4. To confirm or reject strengths, weaknesses, opportunities and threats, One Sample Wilcoxon test was used. It is a non-parametric equivalent of a One-Sample t-test when the data are in ordinal scale. The Wilcoxon Signed- Rank procedure assumes that the sample is random, with a symmetric frequency distribution. The symmetric assumption does not assume normality, simply that there seems to be roughly the same number of values above and below the median. The Wilcoxon procedure computes a test statistic W_{STAT} that is computed by summing the ranked differences of the deviation of each variable from a hypothesized median (2.5). The z-value is calculated (by equation 1) using SPSS v22 software and compared the test statistics with the critical value in the tables. The null hypothesis can be rejected if it is less than or equal to the critical value (Azar and Momeni, 2001; Riffenburgh, 2012).

To determine the final score of each factor, its relative weight is multiplied by its score. Finally, the scores of internal or external factors were obtained by sum of the final scores. At last, a SWOT matrix is built and the strategies are developed as shown in Table 2.

Table 2. SWOT Matrix

External factors	Internal factors	
	S (strength)	W (weaknesses)
O (opportunities)	SO (aggressive strategies)	WO (conservative strategies)
T (threats)	ST (diversity strategies)	WT (defensive strategies)

The determined strategies are prioritized based on the elements of the marketing mix (4Ps) using the AHP technique.

ANP Technique

AHP and ANP are of Multi Criteria Decision Making (MCDM) methods. In AHP, the dependence of the elements is linear (i.e., from top to bottom or vice versa). This means the weights of the alternatives, sub-criteria and criteria WRT their upper level are determined while an element (criteria, sub-criteria, and alternatives) may affect other elements in any direction or even on itself. Therefore, the linear dependence of elements will change to a network relation. For instance, the opportunities are used properly when a company has the capabilities and strengths; otherwise, these opportunities are either missing or exploited by competitors. In other words, SWOT factors may depend on each other. Thus, it is

necessary to use an approach that considers possible dependencies among factors and involves them in the measurement. ANP method is a developed form of AHP that considers correlations and integrates all the internal effects of the components in decision-making (Zebardast, 2010; Jharkharia and Shankar, 2007; Sehat and Parizadi, 2009; Rouhi-Moghaddam *et al.*, 2017). Thus, in this study ANP technique is used to determine the relative weights of weaknesses, strengths, opportunities and threats.

The considered model has four levels of the SWOT analysis as shown in Fig. 2. The first level is the goal (the best strategy), factors are four groups of SWOT, third level consists of the sub-factors of each SWOT group, and the fourth level will be the strategies.

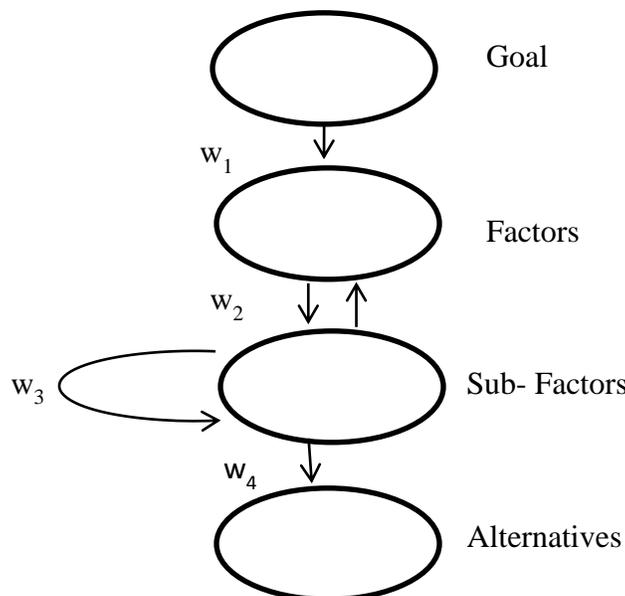


Fig. 2. Flow chart of Analytical Network Process (ANP)

W_1 shows the target vector affecting SWOT groups, W_2 is the effect of SWOT groups on group factors, W_3 is an internal dependency vector among factors of each group, and W_4 is the vector of the effects of factors on strategic alternatives.

Considering the network design model described above and ANP general principles, the steps of using the ANP in the SWOT analysis are as follows (Carlucci and Schiuma, 2008; Lee *et al.*, 2009):

- 1- Building the model and turning the subject into a network structure through a brainstorming or any other methods (Fig. 2).
- 2- Forming paired comparisons and determination of priority vectors.

The weights of the criteria/sub-criteria and the interdependence of factors calculated by the means of paired comparisons like AHP technique in Saaty rating scale. In other words, all criteria/sub-criteria are compared separately relative to each criterion / sub-criterion. Then, the vector of relative weights of the elements is obtained by Equation (4):

$$AW = \lambda_{max} W \quad \text{eq (4)}$$

Where:

A is pair-comparison matrix,
W is the eigenvector (weights) and
 λ_{max} is the largest Eigenvalues (Saaty and Vargas, 2006).

Saaty and Vargas (2006) has provided several implementation methods using software to calculate the eigenvector W.

Formation of super matrix and transforming into limited super matrix

At this level, the internal-priority vector (i.e. calculated W) was inserted into the appropriate columns of a matrix, so a super matrix or a divided matrix is obtained; each part shows the relationship between the two

clusters in a system. The super matrix of the four-level-structures, in Fig. 1 is as follows:

$$W = \begin{bmatrix} 0 & 0 & 0 & 0 \\ w_1 & 0 & 0 & 0 \\ 0 & w_2 & w_3 & 0 \\ 0 & 0 & w_4 & I \end{bmatrix} \quad \text{eq(5)}$$

In this super matrix,

w_1 is the vector of the target effect on the criteria,

w_2 is the vector of the criteria effect on the sub-criteria,

w_4 is the vector showing the effects of sub-criteria on the alternatives, and

I is the Idempotent matrix.

Besides, w_3 is the vectors that show the interactions of criteria and sub-criteria in their group, respectively. It is the primary super matrix. By replacing the internal priority vector (weights) of the elements and clusters in the primary super matrix, an unweighted super matrix is obtained. In the next step, the weighted super matrix is calculated by multiplying the values of The unweighted super matrix in the cluster matrix. Then, the super matrix is randomized regarding the column by normalizing the weighted super matrix. In the third step which is the final stage, the limited super matrix is obtained by squaring all the factors of un-weighted super matrix where the divergence is achieved through repetition. In other words, all factors of the super matrix are identical (Zebardast, 2010):

$$\lim_{k \rightarrow \infty} W^k \quad \text{eq(6)}$$

If the super matrix considers the whole network, i.e. the alternatives are considered in the super matrix; in the third step, the general priority of the alternatives should be obtained from the alternative column in the normalized super matrix. If the super matrix includes only one part of the network that is interdependent and the alternatives do not consider in the super matrix, some extra

calculations are necessary to reach the overall priority of the alternatives. Finally, the alternative with the highest overall priority is selected as the best alternative for the subject.

One of the advantages of ANP is controlling Consistency Ratio (CR). In other words, this ratio is obtained by dividing Consistency Index (CI) by Random Incompatibility (RI), and judge about its goodness or acceptance.

$$CR = CI / RI \quad \text{eq(7)}$$

CI is calculated by Equation (8):

$$CI = \left(\frac{\lambda_{max} - n}{n - 1} \right) \quad \text{eq(8)}$$

RI is randomly generated and its values for the n-dimensional matrices would be according to Table 3. (Zivkovic *et al.*, 2015).

Table 3. Table of consistency ratio of Random Incompatibility (RI)

N	1	2	4	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

The acceptable range of CRs depends on the decision-maker in each system. All in all, if the ratio of CR is greater than 0.1, the decision maker would better revise his judgment (Saaty and Vargas, 2006).

Sampling Method

The active experts in the field of *Ferula assa-foetida*, the medicinal herb in Kerman province are 23 consisted of the rangeland headquarters experts of *Ferula assa-foetida* in Kerman according to the authorities of the province's natural resource office. Due to the vastness of the province, a simple random sample of 19 experts was chosen by implementing equation (9), considering 10% error (ϵ), $p = 0.5$, and $\alpha = 5\%$ (Azar and Momeni, 2001):

$$n = \frac{N Z_{\frac{\alpha}{2}}^2 P(1 - P)}{\epsilon^2(N - 1) + Z_{\frac{\alpha}{2}}^2 P(1 - P)} \quad \text{eq (9)}$$

Where: n = sample size, N = statistical population, Z = standard variable and p = probability of success on a single trial

The authors designed two pairwise comparison questionnaires in the form of Saaty nine-scale alternative. Using the experts' opinions, the relationship between the sub-criteria (factors) and the internal dependence on them was determined and the first questionnaire was designed to formulate the strategies. The second one designed to prioritize the formulated strategies. The data were collected in the summer of 2017

Results

To formulate the operational strategies of *Ferula assa-foetida* branding in Kerman, out of the 12 strengths, 10 weaknesses, 10 opportunities, and 8 determined threats by the authors, the confirmed (validated) factors were identified using the One Sample Wilcoxon Signed-Rank test and the experts' opinion. (Table 4).

Table 4. Introducing the confirmed (validated) strengths, weaknesses, opportunities, and threats

Main criteria	Sub-criteria	Symbol	Z-statistic
Strengths	Being organic	S1	-2.933 **
	Sweet and bitter type of operation	S2	-2.512 **
	Somewhat pests and disease resistance	S3	-2.244 *
	Optimum juice quality	S4	-2.512 *
	Local knowledge of local communities	S5	-2.862 **
	The breadth of rangelands	S6	-2.893 **
	Supervision and management of Forests and Rangelands Organization	S7	-2.456 *
Weaknesses	Inability to cultivate	W1	-2.862 **
	Non-Separation of sap with different purity	W2	-2.933 **
	Lack of proper marketing and practical ideas	W3	-3.218 **
	Frequency of harvesting years and no accurate predicting of it	W4	-2.807 **
	The existence of non-local intermediaries and the lack of specialized workers	W5	-3.218 **
	Lack of government support	W6	-3.218 **
	Sale in bulk and in appropriate packaging	W7	-2.640 **
Opportunities	Creating employment and improving livelihoods for Pasture holders	O1	-2.893 **
	The existence of suitable climate and soil	O2	-3.520 **
	Establishment of conversion industries	O3	-3.220 **
	Agricultural educated and unemployed labor force in the countryside	O4	-3.508 **
	Potential exchange gain and increasing investment in agricultural sector	O5	-2.841 **
Threats	Smuggled harvesting, destruction and endangering the resources	t1	-3.508 **
	Sanctions and the impossibility of international banking transactions	t2	-2.504 *
	Drought and environmental changes (such as precipitation and temperature)	t3	-2.933 **
	Price fluctuations	t4	-3.220 **

*, ** significance at 5% and 1% respectively

After designing and completing the first pairwise questionnaire, the weight of the criteria (strengths, weaknesses, opportunities and threats) was calculated using equation 4. The results in Table 5 show that the weight

of the strengths and opportunities on this medicinal herb was greater than the weight of the weaknesses and threats although the weight of the threats was also significant.

Table 5. Ranking of main criteria

Criteria	Weight	Rank
Strengths (S)	0.355	1
Opportunities (O)	0.250	2
Threats (T)	0.243	3
Weaknesses (W)	0.152	4
Total weight	1	

Table 6 shows the weights of internal factors' matrix in compiling branding strategies. The third column is the relative weights of the sub-criteria, the fourth column includes the normalized weights of each of the sub-criteria in the total internal factors, and the fifth column indicates their weight. Each sub-criterion, which is less important in branding as compared to the

others, was scored 1. Low, moderate, and most significance were scored 2, 3 and 4, respectively. The sixth column was calculated through multiplying the relative weight of the sub-criteria in the rating given to each sub-criterion. It is noticeable that the two factors of optimal quality of juice and the extent of existing ranges with the highest weight has higher potential in a particular

brand of *Ferula assa- foetida* in the province. Government support is needed regarding the highest weight of the weakness

factor of lack of government support as compared to the others.

Table 6. Weights of the internal factors of formulating the branding strategies of *Ferula assa- foetida* in Kerman

Internal Factors	Sub-Criteria	Relative Weights	Weight in Internal Factors	Score	Weighted Score
Strengths	Being organic (S ₁)	0.029	0.020	3	0.060
	Sweet and bitter type of operation (S ₂)	0.124	0.086	4	0.344
	Resistance to pests and diseases (S ₃)	0.052	0.036	3	0.108
	Optimum juice quality (S ₄)	0.317	0.221	4	0.884
	Local knowledge of local communities (S ₅)	0.062	0.043	3	0.129
	The breadth of pastures (S ₆)	0.246	0.171	4	0.684
	Supervision and management of Forests and Rangelands Organization (S ₇)	0.170	0.118	4	0.472
Weaknesses	Inability to crop (W ₁)	0.146	0.044	1	0.044
	Non-Separation of sap with different purity (W ₂)	0.094	0.029	1	0.029
	Lack of proper marketing and practical ideas (w ₃)	0.119	0.036	1	0.036
	Frequency of harvesting years and no accurate predicting of it (W ₄)	0.075	0.023	2	0.046
	The existence of non-local intermediaries and the lack of specialized workers(W ₅)	0.042	0.013	2	0.026
	Lack of government support (W ₆)	0.446	0.136	1	0.136
	Sale in bulk and in appropriate packaging (W ₇)	0.078	0.024	1	0.024
Total		-	1.000	-	3.02

Table 7 shows the weights of the external factors of branding strategies for *Ferula assa foetida*. The two factors of opportunities; establishment of conversion industries, and potential exchange gain and increasing investment in the agricultural sector had

significantly more weight, showing high potential of *Ferula assa- foetida* branding in the region. On the other hand, sanctions and lack of international banking transactions are also the major threats to exchange gain.

Table 7. Weights of The external factors of formulating branding strategies of *Ferula assa- foetida* in Kerman

External Factors	Sub-Criteria	Relative Weights	Weight in Internal Factors	Score	Weighted Score
Opportunities	Creating employment and improving livelihoods for Pasture holders (O ₁)	0.147	0.074	4	0.296
	The existence of suitable climate and soil (O ₂)	0.139	0.071	4	0.284
	Establishment of conversion industries (O ₃)	0.342	0.173	4	0.692
	Agricultural educated and unemployed labor force in the countryside (O ₄)	0.035	0.018	3	0.054
	Potential exchange gain and increasing investment in agricultural sector (O ₅)	0.337	0.171	4	0.684
Threats	Smuggled harvesting, destruction and endangering the resources (T ₁)	0.251	0.124	1	0.124
	Sanctions and the impossibility of international banking transactions (T ₂)	0.319	0.157	2	0.314
	Drought and environmental changes (T ₃)	0.128	0.063	1	0.063
	Price fluctuations (T ₄)	0.302	0.149	2	0.298
Total		-	1.000	-	2.81

The results of developing strategy show that (SO) strategy with the highest weight has been determined as the main strategy in the field of branding of *Ferula assa-foetida* in Kerman by the experts. There is also a

stretch towards strengths and opportunities on the radar chart (Fig. 3). In other words, using strengths and taking advantage of the available opportunities, *Ferula assa-foetida* has a high potential of branding.

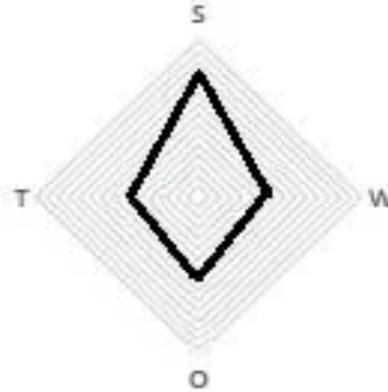


Fig. 3. Radar position of the internal and external factors

According to the obtained results, strategies and their associated operational plans were formulated based on the marketing mix. To prioritize the operational plans, the second pairwise questionnaire was designed. After completing the questionnaires by the

selected experts, the ranking of operational plans was performed using the AHP technique, the results are presented in Table 8. The reliability of the questionnaire was confirmed with an inconsistency rate of 0.061.

Table 8. Ranking the operational strategies based on marketing mix (4P_s)

Strategy area	Strategy Title	Operational Strategic Plan	weights
Product	Improving the process of production and processing asafoetida oleo-gum-resin using modern technologies (s ₄ , s ₅ , s ₆ , s ₇ , o ₁ , o ₂ , o ₄)	1. Providing the necessary fields for establishing conversion industries to create employment and prevent bulk sales	0.120
		2. Conducting applied research under the supervision of the Forests and Rangelands Organization using the ability of graduates to acquire new knowledge and technologies	0.115
	Improving the production of <i>Ferula assa-foetida</i> based on natural situation and native knowledge (s ₂ , s ₃ , s ₅ , s ₆ , s ₇ , o ₂ , o ₃)	1. Proper use of natural situation, sweet and bitter type of operation, resistance to pests and diseases and area of habitats to increase the organic production of <i>Ferula assa-foetida</i> plant in Kerman	0.044
		2. Using indigenous knowledge of local communities in the field of harvesting, rehabilitation and using <i>Ferula assa-foetida</i> in the establishment of conversion industries to create a specific regional brand	0.032
Price	Matching pricing practices in target markets (s ₁ , s ₄ , s ₆ , o ₅)	Modeling the successful countries in the field of processing, pricing and branding of the herb medicine to get more value in this sector	0.337
Distribution	Facilitating the supply of these products to export markets (s ₁ , s ₂ , s ₄ , o ₅)	1- Establishing an appropriate international banking mechanism to facilitate the export of asafoetida oleo-gum-resin	0.197
		2. Identifying the target countries for exporting and supplying products that are tailored to the needs of these countries	0.075
Promotion	Focus on the natural position and marketing possibilities to promote the product (s ₁ , s ₂ , s ₃ , s ₆ , s ₇ , o ₅)	1. Using the potential of electronic marketing to interact more easily with target markets and product identification, in line with branding <i>Ferula assa-foetida</i>	0.021
		2. Increasing the competitive advantage of <i>Ferula assa-foetida</i> in Kerman using promotional tools and relying on the factors of organic, optimal juice quality and monitoring and management of natural resource organization	0.020

Sensitivity analysis of alternatives (The operational plan of the strategies)

The purpose of sensitivity analysis is to determine whether the weight of the alternatives can decrease or increase without changing their ranking. We can also recognize the variations in weight of the alternative that could have a greater effect on the results. The results show that the alternative rates do not change as long as the standard weight of the strengths varies from 33.16 to 78.94%. The alternative rates do not

also change as long as the weight of the opportunities varied in the range of 11.33% to 54.95%. The results showed that changing the alternative of “conducting applied research under the supervision of the Natural Resources Organization using the ability of graduates to gain new knowledge and technologies” would make the most changes. The ranking of alternatives against weaknesses and threats did not show any sensitivity.

Discussion

In this study, to formulate branding strategies, the determined strengths, weaknesses, opportunities and threats were confirmed by the use of Wilcoxon Signed-Rank test, and were ranked using ANP technique. All the strengths and their weights show that *Ferula assa-foetida* has the potential dimensions of Brand Associations & other Proprietary Assets and Brand Loyalty (S₁, S₂, S₃). Strengths (S₁ and S₄) and opportunities (O₂ and O₄) also show the potential of Perceived Quality dimension of branding. However, due to Sanctions and the impossibility of international banking transactions (T₂), the possibility of brand awareness is reduced. The results showed Kerman is in (SO) status, in terms of branding potential. Therefore, five strategies in the form of marketing mix factors (4Ps) and their nine operational plans were determined and prioritized using the AHP technique.

It is currently not possible to process asafoetida, and the oleo-gum-resin is graded and sold raw. However, as mentioned, there is a great potential for *Ferula assa-foetida* product and market development due to its natural position; the size of the habitats, its organic type, and the bitter and sweet exploits. Habibi Qahfarakhi (2013) also believes that the main problem in the development of medicinal plants is the marketing of these products. Forouze and Mirdeilami (2018) also introduce marketing as one of the priorities of businesses related to medicinal plants. Therefore, in order to improve the *Ferula assa-foetida* production and processing, the necessary facilities should be provided to match pricing practices in target markets. In this regard, it is imperative to model successful countries. We can also model the successful experiences of pistachio and date cooperatives that run on a semi-public-semi-private basis. Creating research units in the

Forests and Rangelands Organization, or in these cooperatives will greatly influence the development, upgrading and branding of the product. An active presence in the global market not only requires tailoring pricing practices to target markets, but also delivering a product tailored to the needs of the markets. It can use e-marketing potential to facilitate interaction with target markets and better introduce the product. In order to identify the brand of *Ferula assa-foetida*, its organic type and optimum quality of the juice can be emphasized. However, for a continuous presence in foreign markets, given the status of sanctions against Iran, it is necessary to create an appropriate international banking mechanism. Asafoetida oleo-gum-resin is exported to India, Pakistan, some Persian Gulf States, Germany, China and South Africa (Ghasemi Arian *et al.*, 2017). Fortunately, under the existing sanctions conditions, Iran has an economic relationship with the countries concerned, and it is possible to create a proper international banking mechanism to ease exports.

Asafoetida oleo-gum-resin is used in the industry for preparing diamond adhesives and in medicine as anticonvulsant, anti-parasite, suppressor, carminative and for the treatment of hysteria. It is also used for the treatment of septic ulcers, gastrointestinal and digestive parasites, chronic bronchitis, dyspnea and sputum consumption, and in the food industry, perfumery, dyeing and fabrication of detergents, as well as pest control (Ghasemi Arian *et al.*, 2017). Therefore, by providing the necessary bases for the establishment of conversion industries, a considerable exchange can be gained by its exports, which reduces country's economic dependence on oil exports. Asghari Mirak and Mohammadzadeh Hesari (2013) also considered the use of medicinal plants in non-oil exports as one of the best ways to dispense with the single-product economy of

oil and its vulnerability. The impact of the presence of medicinal plants in the global market and their positive impact on the economy in Pakistan (Sher *et al.*, 2014) and South Africa (Quiroz *et al.*, 2014) was also reported. By targeting natural conditions, the product has good potential for branding. Marketing studies aimed at the proper use of such conditions; organic product, bitter and sweet species, optimum juice quality of this medicinal plant should be done under the supervision of the Forests and Rangelands Organization. Mentioned aspects are good approaches of continuous presence in the domestic and foreign markets. It suggested that the Forests and Rangelands Organization provide the context to employ graduates and make greater involvement of the private sector to strengthen the branding of *Ferula assa- foetida*. Furthermore, the business environment would improve as well. Recently, in the world business report, Iran has ranked 18th among the 25 countries as regional rivals, mostly in the Middle East and Iran's neighbors, which is above Syria, Yemen, Afghanistan, and others.

According to the strength and opportunities to provide a specific brand, strategies and operational plans in the product field (of the marketing mix) can be developed in the long- run. Due to the restrictions on international banking, there are many export limitations even for the best products. However, in the short- run, at least to maintain the current market, the operational plan of determining the appropriate banking mechanism (the distribution field of the marketing mix) is recommended in any possible way.

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تدوین راهبردهای عملیاتی برندسازی گیاه دارویی آنغوزه (*Ferula assa-foetida L.*) (مطالعه موردی: مراتع استان کرمان)

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چکیده. استان کرمان از نظر وسعت مراتع گیاه دارویی آنغوزه، *Ferula Assa-foetida* گونه‌ای از تیره Umbelliferae از رتبه بالایی برخوردار است. صمغ آنغوزه از ریشه این گیاه استخراج شده و در پزشکی و صنعت بکار می‌رود. از نظر اقتصادی ارزش بسیاری برای ذینفعان و صادرکنندگان دارد. از آنجا که برندسازی یکی از موضوعات مهم در زمینه اقتصاد منابع طبیعی است، هدف از این مطالعه بررسی استراتژی‌های برندسازی این گیاه دارویی با استفاده از تکنیک SWOT در استان کرمان است. در این راستا نمونه‌ای تصادفی از ۱۹ نفر از خبرگان شاغل در حوزه گیاهان دارویی آنغوزه اخذ گردید. داده‌های لازم با انجام مصاحبه حضوری و تکمیل پرسشنامه در تابستان سال ۱۳۹۶ جمع‌آوری گردید. پس از شناسایی نقاط قوت، ضعف، فرصت‌ها و تهدیدهای برندسازی آنغوزه، با استفاده از تکنیک تحلیل شبکه‌ای (ANP) در تعیین اوزان آن‌ها، استراتژی‌ها تبیین شد. نتایج تحقیق نشان داد که استان کرمان در حوزه پتانسیل برندینگ در وضعیت راهبرد قوت-فرصت (SO) قرار دارد. لذا در این حوزه پنج استراتژی و نه برنامه عملیاتی براساس عناصر آمیخته بازاریابی (4Ps) مشخص و با استفاده از تکنیک تحلیل سلسله مراتبی (AHP) رتبه‌بندی شد. استراتژی‌های حوزه قیمت و محصول اهمیت بیشتری نسبت به حوزه توزیع و ترفیع داشته‌اند. الگو گرفتن از کشورهای موفق در زمینه فرآوری، قیمت‌گذاری و برندسازی گیاه دارویی آنغوزه (با وزن ۰/۳۳۷) در حوزه قیمت به‌عنوان اولین برنامه عملیاتی توسط خبرگان شناخته شد. لذا انجام مطالعات با هدف استفاده صحیح از وضعیت طبیعی، وجود گونه‌های تلخ و شیرین، مقاومت در برابر آفات و بیماری‌های این گیاه دارویی تحت نظارت سازمان جنگل‌ها و مراتع، راه حل مناسبی برای حضور مستمر در بازارهای داخلی و خارجی است.

کلمات کلیدی: گیاهان دارویی، تکنیک SWOT، تکنیک تحلیل شبکه‌ای (ANP) و تحلیل سلسله‌مراتبی (AHP)