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A model presentation to select e-commerce strategy in Iranian hand-woven carpet export using SWOT analysis and TOPSIS technique

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ABSTRACT

Today, the importance of the independence of a monoculture economy and foreign exchange earnings from oil experts has not been concealed from anyone. Given potentials and proper infrastructures of handicraft production, particularly hand-woven carpet, in Iran, on the one hand, and the development of e-commerce in offering more efficient and comprehensive products in the world market on the other hand, the opportunity is opened up for the country's carpet industry activists, so that they can have more prominent contribution to this arena by more accurately recognizing the space governing e-commerce around the world, and determining a good strategy, as well as playing a leading role in the development of non-oil exports, foreign exchange profit making, growth and development of the country. The purpose of this paper is to come up with an effective model for identifying and selecting e-commerce strategies in Iran's hand-woven carpet. In this research, we analyzes the strengths and weaknesses as well as threats and opportunities prevailing in hand-woven carpet export in the context of e-commerce using SWOT matrix, and determined the weights (importance) of aspects, and criteria of the matrix as well as the ranking of identified strategies using Shannon Entropy and TOPSIS technique.

KEYWORDS: strategic planning, e-commerce, SWOT matrix, Shannon entropy method, TOPSIS technique

1. INTRODUCTION

Modern world and global economy have witnessed wide-ranging developments in the field of information exchange and development of new information and communication technologies, which makes it inevitable to employ and adopt new methods and policies in business management and venture. Accordingly, we need to employ new commercial practices in business, which include the application of electronic data exchange standards and transaction using e-markets. In this regard, small and medium industries as a vital part of economic growth should assess the current level of their industry readiness using a proper evaluation tool in order to successfully enter electronic market. It is because they may experience failure, if they have no readiness enough to enter electronic market [1]. Considering the importance of small and medium enterprises, it is absolutely imperative to make them coordinated with market requirement and condition including the application of e-commerce and e-market potentials [2]. One of the most important advantages of e-market use is the opportunity for very small companies to get access to global markets more than ever. The feature allows for a remarkable rise in the size of world export via internet [3]. Kulatunga (2008) categorized benefits from e-commerce into direct and indirect benefits. Direct benefits are defined as measurable benefits, that is, we are able to measure them by means of data analysis and variable measurement (e.g. number of new customers). Indirect benefits are seen as situational factors in business such as customer goodwill and loyalty, which cannot be measured easily.

The only way to get the country out of a monoculture economy and dependency on foreign exchange earnings from oil sales, as well as fulfilling growing national foreign exchange requirements is the development of non-oil market and access to global markets. As for Iran, due to a comparative advantage in the production of handicrafts especially hand-woven carpets, frequent manpower, and high rate of employment, the significance and necessity for marketing and exporting the commodity are quite clear. On the other hand, due to the fact that handicrafts industries, especially carpet, are a mix of art and creativity and representative of historical, social, cultural characteristics, and an important factor in recognizing culture and culture of Iranian territory, its export can attract tourists from different countries and bring prosperity to the tourism industry of the country, which in turn bring the prosperity of handicrafts industry including carpet as well as a rise in national foreign exchange earnings [5].

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Awareness and use of e-commerce are deemed necessary for all firms and enterprises trying to account for customer's needs in the shortest possible time and achieve their goals and programs. This also specifically applies to woven-carpet which is one of the most important national foreign exchange resource. Companies are recommended to meet their customers' need via internet, advertisement as well as providing necessary information, including signing a contract with companies offering credit card services and transportation companies in order to build an electronic relationship.

Despite advantages mentioned concerning e-commerce, the growth of electronic business between small and medium firms in the country is very smaller than what was expected, as it appears that special companies and organizations are able to enter; hence a true revision is deemed necessary to identify problems caused by being introduced to e-business [6]. Some organizations have turned to e-commerce and e-markets without the realization of necessary prerequisites, which in turn caused loads of troubles for them [1]. Accordingly, it is necessary that every enterprise gain a good understanding of its internal weaknesses and strengths as well as opportunities and threats in the workplace in order to effectively being introduced to international export from the context of e-business, so they are able to take more effective step in gaining an opportunity to grow and boom and elevate the country by identifying and adopting proper strategies. Given the gap in studies on this context, the present study seeks to provide an effective model to select a strategy for e-business in hand-woven carpet export using SWOT analysis and TOPSIS technique. The article is thus organized as follows.

In the second part, the theoretical basis of the research is explained in detail. In the third part, the methodology of the research and a proposed model are introduced. The analysis of data collected from exports based on the steps of the proposed model is presented in the fourth part. Finally, in the fifth part, the results and suggests for future studies are given.

2. Theoretical foundations of the research

2.1. Electronic market

In order to recognize the applications of internet in business, we should identify the area of -business application and estimate the resulting effects by focusing on internal and external origination procedures [7]. Electronic market (e-market) promises to improve market efficiency, transaction cost reduction and new profit making [8]. E-market provides digital environment where buyers and sellers can visit and browse products, exhibit their products, determining prices for them. Moreover, companies can hold an auction in this space where buyers give new purchase opportunity to some sellers so that products can be transacted by suggested price on the part of buyer as well as fixed or negotiable prices [9]. Therefore, e-market technologies provides new opportunities for organizations and business activists. By these technologies, activities are performed in a new situation, and new business models, though impractical so far, will emerge [10].

2.2. E-business

Electronic business (e-business) utilize every kind of business venture based on network that change internal and external relations in order to set value as well as market opportunities derived from network economy. Today, improving business environment is seen as a key factor in acquiring further share in international markets on the part of Iranian woven-carpet exporters and traders. Improving the business environment and making it virtualized lead to the improvement of exports which is included in national policy makers 'concerns. Business environment virtualization requires transportation infrastructures, e-business related regulation set by governmental agencies, the improvement of banking services etc. [11]. E-business include: e-business, e-healthcare, e-helpdesk, e-procurement, e-training, e-learning.

E-commerce is one dimension of e-business. E-business includes customer relationship management (CRM) and collaboration and relationship between companies, as well as e-commerce. After all, the most important and common applicable aspect of business and trade which are addressed as they are called an intermediary level between business and e-business, so the essential foundations for addressing concepts and functions of e-business and better understanding of obstacles to the development of the concepts are provided in Iran[12]. 2.2.1, E-commerce

E-commerce is defined as the electronic completion of processes undergone with the aim of exchanging money, goods, services, and information. The difference between e-commerce and e-business lies in the type of business activity that each cover. E commerce simply includes the activities of the commercial unit of an organization, namely bidding, price quotations, order negotiation, shipping, delivery, and payment. Yet, in addition to the processes, business include activities such as customer relationship management, supply chain management, enterprise resource planning [13]. E-commerce includes a wide variety of criteria including e-exchange of products and services, fast data transfer, electronic fund transfer, electronic bills, direct marketing, etc. [11].

2.2.2. E-commerce models

The rapid growth of electronic exchange information and communication networks in recent years opened up new horizons to business sector. New methods of information production, processing, and transmission bring high efficiency, and productivity, accuracy, speed of building communication, and cost reduction in companies and commercial organizations. This would facilitate trade and raise the competitive power of commercial sector. Today, activities, such as the recognition of commercial partners, building connection with buyers and sellers, introducing new products and services, achieving markets, and fulfilling resources and commodities with the help of e-commerce, are performed with greater efficiency and lower costs. In this regard, it is of importance to note that the completion of this type of business is possible by a variety of methods, the main types of them are given in table (1). In addition, different categorizations of the models are presented, according to which it seems that we can find the categorization in table (1) exhaustive [3].

government	enterprise	consumer	
G2Ggovernment exchange	G2Binformation exchange	G2Cinformation exchange	government
B2Gtax	B2Be-commerce	B2Ce-commerce	enterprise
C2Gtax pay	C2Bprice comparison	C2Cforeign markets	consumer

Among models defined, the major activities are performed based on B2B and B2C. With respect to ecommerce of carpet industry, it seems that both models are more applicable than other. However, this does not mean that other models are not important enough or they are not important in terms of e-commerce process.

2.2.3. The comparative advantages of e-commerce

Since the application of electronic data exchange commercial transactions until now that World Wide Web is considered the most effective instrument for e-commerce process, considerable competitive advantages accrues to individuals and companies turned to the commercial practice. Evidence suggesting the advantages refers to the necessity of consideration to other countries' interest in e0commerce.

The advantages of e-commerce application are associated with maintaining business communication, matter of accuracy and time savings coming from communication. That is, the fast transmission of data and the potential for conducting plenty of business transactions within a few minutes increase the efficiency of business to a great extent. In addition to this, the advantages obtained from electronic business can be according to a new classification classified into two classes; supplier-related and customer-related advantages.

Indeed, electronic instrument of goods supply represents the instrument that embrace supply activities including logistic activities and supply management. Since manufacturer- retailer work stream depends on demand and supply operation in a row, two-component conceptualization parallel the function of electronic device in the manufacture-retailer relationship [14].

Considering the significance of electronic business to global economy and its remarkable growth, the necessity for using internet marketing can be explained with respect to export as follows:

The direct relationship between seller and buyer is concerned without a limitation in time and space, easy access to vast amount of data, savings in time and space, marketing costs reduction compared to traditional marketing, global access and customer orientation, in that the use of internet technology can facilitate on-line pricing and designing goods quality determining, thereby increasing Customerism every day. According to these items, export can be increased, which in turn increase investment and employment rate [15].

2.3. E-commerce strategies

Strategic decision about the use of ICT in line with organization business strategy can shape e-commerce strategies [16]. With a systematic view on the process of transactions in an organization, we can come to an understanding that transactions can accomplished both with supplier part and customer part. Strategic decision about the implementation of electronic transactions with either part in an organization (customer or supplier) depends on the level of firm e-readiness and competitive strategy [17].

The first strategy include the launch of a website to provide information to customers, registration of a brand for a company, the sale of products in online format, electronic order taking and transaction integration. As for the strategy, e-commerce as a mechanism for doing marketing activities are concerned, which is known as "costumer-based development related e-commerce strategy" [18]. The second strategy is proposed to focus on providing customer service, providing complete information on products, mutual interactions at the time of sale and post-sale process, establishing database in order to provide question and answer for customer, maintaining purchase information of customers so as to conduct strategic study, giving a clear account of goods return procedures and setting up total security in the network [19]. However, the third strategy is associated with purchase management

and supplier party in a company. The strategy include transaction costs reduction through reducing negations with suppliers on search, price, payment, and integration. In the strategy, e-commerce was used to improve the processes of organizational purchase [20, 21].

2.4. A framework for developing strategy

In actuality, in the process of developing strategy for an organization, the first stage is evaluation, and analysis of internal and external factors in organization. In the second stage, a variety of feasible strategies are concerned, and a balance is maintained between internal and external factors. There are various instruments for extraction and development of a strategy for organization, including the most notable and practical instrument is SWOT matrix. In what follows, the instrument and its features are introduced to some extent.

2.4.1 SWOT matrix

SWOT analysis summarizes the most important internal and external strategic factors which are likely to have an effect. External and internal environment include variables that cannot be controlled or can be controlled by and organization; management has no short-term effect on either of the two variables. On the contrary, the variables and forces can include potential effects engaging at the same time in restrictions on organization performance or objectives of which organization is in quest. The type of information can be systematically obtained through four types of different combinations--SO strategy, WO strategies, ST strategies, WT strategies, in SWOT analysis matrix [22]. The analysis of strengths, weaknesses, threats, and opportunities builds a framework that facilitates determining and developing strategies. In the implementation of SO strategies, organization would make use of the opportunities in the environment using its strengths. The objective of WO strategies is to lead organization to improve its weaknesses by using available opportunities in the external environment. With the use of ST strategies, organization can put into action its strengths to reduce the impacts of external threats. However, an organization that adopts WT strategy would opt for a defensive alternative with the aim of reducing its internal weaknesses and avoiding external threats. Upon using SWOT matrix, the crucial problem is the use of specific strategies rather than overall or general strategies [23].

We need to point out that the proper use of SWOT analysis can be a good basis of strategy formulation. With a more specific glance, we need to note that SWOT allows analyst to classify internal factors (strengths and weaknesses) and external factors (opportunities and threats) in relation to decision made, so analyst is able to compare threats and opportunities with strengths and weaknesses; however, the result of SWOT analysis is mostly an incomplete qualitative list providing internal and external factor review, thus SWOT analysis cannot give us a comprehensive and exhaustive evaluation of strategic decision making process [24].

3. Methodology and proposed model

The present research is an applied study in term of objective, and it is a descriptive-survey study in terms of data collection method. The necessary data about the identification of final variables, and strategies of SWOT matrix dimensions, and the necessary data on criteria weighting and strategy ranking were collected through interview and distribution of questionnaire among experts (consisting of 7 professors specialized in the field of information technology and e-commerce management, and 12 activists in the field of national hand-woven carpet industry). Considering the limitation of the number of experts familiar with hand-woven carpet e-commerce, sampling was undertaken in a purposeful judging manner.

Fig. 1. The proposed model of the present study to select e-commerce strategy in hand-woven carpet exports in stepwise manner

Fig. 1. Proposed model of the study



Despite the advantages of SWOT analysis, observations revealed that the approach have weaknesses in measurement and evaluation steps. Practically, due to quantity-free characteristic of factor importance, the analysis would not lead to the recognition of the impact of each factor in strategy objectives (Masuzera et al, 2006). In other words, SWOT analysis is not an analytical device in order to identify relative importance of contributing factor, nor can it be a good priority for strategy alternatives extracted based on the four-fold factor of inside and outside environment analysis. Thus, in the present study, in order to solve the deficiency and quantify the importance of SWOT matrix factors, an integrated method for multivariate decision making techniques (consisting of entropy Shannon and TOPSIS techniques) was used. In what follows, we briefly elaborate these two methods.

3.1. Entropy Shannon

Entropy is in information theory a parameter for uncertainty which is expressed by the probability distribution P_i . The measurement of the uncertainty is explained by Shannon as follows [25]:

(1)
$$S(P_1, P_2, ..., P_n) = -k \sum_{i=1}^n P_i \ln P_i$$
; $i=1, 2, ..., n$

where K is a constant. Since the above equation is used in statistical calculation, it is known as entropy of probability distribution. The terms entropy and uncertainty are applied in a concept. When P_{is} are equal (for all values i and j), thus $P_i = \frac{1}{n}$

Suppose in the decision-making matrix D, there are m alternatives and n indices,

(2)
$$\mathbf{D} = \begin{bmatrix} \mathbf{X}_{11} \mathbf{X}_{12} & \cdots & \mathbf{X}_{1n} \\ \vdots & \ddots & \vdots \\ \mathbf{X}_{m1} \mathbf{X}_{m2} & \cdots & \mathbf{X}_{mn} \end{bmatrix}$$

In this decision making matrix, \mathbf{P}_{ij} can be used to evaluate various alternatives. \mathbf{P}_{ij} can be calculated as follows:

(3)
$$\mathbf{P}_{ij} = \frac{x_{ij}}{\sum_{j=1}^{m} x_{ij}}$$
; $\forall i=1,2,...,m; j=1,2,...,n$

In which case, entropy of each j index can be calculated as follows:

ln m

(4)
$$\mathbf{E}_{j} = -\mathbf{k} \cdot \sum_{i=1}^{m} \mathbf{P}_{ij} \ln \mathbf{P}_{ij}, \quad \forall j = 1, 2, \dots, n$$

and Ej is remained between zero and one.

In what follows, the value of deviation degree (dj) can be calculated, the value states what of kind of useful information jth index can provide for decision maker; the more closer to one another the measured value of each index, the less different there will be among competing alternatives. Thus, the role of the index in decision making should be equally reduced, therefore

(6)
$$d_j = 1 - E_j$$
; $\forall j = 1, 2, ..., n$

(7)
$$W_j = \frac{d_j}{\sum_{j=1}^{n} d_i}; \forall j = 1, 2, ...$$

It should be noted that in the above equations, j index represents the number of SWOT dimension. In order to break relevant index into SWOT matrix dimensions, we used jk index for all criteria.

"n

2.3. TOPSIS technique

The technique is considered a compensatory method in MADM. By compensatory, we mean the exchange between indices in the model is allowed. In the method, in addition to a space of alternative from the positive ideal point, the space of negative ideal point is also considered; that is, the selected alternative should have the least distance from positive ideal point, as it has the maximum distance from the negative ideal point. In the technique, we require the use of quantitative data, so we need to turn them into quantitative values using appropriate criteria. Moreover, since all criteria do not include equal importance, TOPSIS technique receives set of weights from decision makers. As mentioned, the research used Entropy Shannon in order to achieve the subjective preferred weights of DMs derived from their experiences, knowledge, and understanding of the problems. In what follows, the steps of TOPSIS technique are defined [26].

Step 1: obtaining scale-free matrix using Euclidean Scale

(8)
$$\mathbf{r}_{ij} = \frac{\mathbf{x}_{ij}}{\sqrt{\sum_{i=1}^{n} \mathbf{x}_{ij}^{2}}} \quad \forall j = 1, 2, ..., n$$

Step 2: creating a weighty scale matrix (V) with a given vector of indices weight (W) and scale free matrix as inputs: (9) V=R.W

Step 3: determining positive and negative ideal alternatives

Positive ideal alternative;

(10)
$$\mathbf{A}^* = \{ (\max_i \mathbf{V}_{ij} | \mathbf{j} \in \mathbf{J}), (\min_i \mathbf{V}_{ij} | \mathbf{j} \in \mathbf{J}) | \mathbf{i}=1,2,3,\dots,m \} = \{ \mathbf{V}_1^*, \mathbf{V}_2^*,\dots,\mathbf{V}_n^* \}$$

Negative ideal alternative;

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(11)
$$A^{-}=\{(\min_{i} V_{ij} | j \in J), (\max_{i} V_{ij} | j \in J) | i=1,2,3,...,m\} = \{V_{1}, V_{2},...,V_{n}\}$$

Where $J=(j=1,2,3,...,n_j)$ is related to profit criteria

Where $\mathbf{J} = (\mathbf{j} = 1, 2, 3, ..., \mathbf{n} \mathbf{j})$ is related to costs criteria

Step 4: calculating distance level

jth alternative distance is as follows with respect to ideals using Euclidean Scale

(12)
$$\mathbf{S}_{i}^{*}: \sqrt{\sum_{j=1}^{n} (V_{ij} - V_{j}^{*})^{2}}; i=1,2,3,...,\mathbf{m}$$

(13)
$$\mathbf{S}_{i}^{*}:\sqrt{\sum_{j=1}^{n}(V_{ij}-V_{j})^{2}}; i=1,2,3,...,m$$

Step 5: calculating relative approximation A_i to ideal:

(14)
$$C_i = \frac{S_i^*}{S_i^* + S_i^*}; \quad 0 \le C_i \le 1; i = 1, 2, ..., m$$

Stage 6: ranking alternative

4. Data analysis

In this part, given data and information derived from library studies and application of experts' views, we evaluate and determine e-commerce strategy in Iran's hand-woven carpet exports in accordance with the stages of the proposed model.

✓ Step 1: thoroughly reviewing and identifying the criteria of SWOT matrix dimensions using library studies

In the first step, with a thorough review of previous works concerning e-commerce in hand-woven carpet industry, we extracted internal and external contributing factors (criteria) in this context. Considering the magnitude and extent of these factors, it is necessary to determine and/or aggregate the most important factors affecting them.

Step 2: providing primary criteria for the experts to finalize and screen them and determine possible strategies and create SWOT matrix

In this stage, in order to summarize and determine the most important internal and external contributing criteria in national hand-woven carpet exports in e-commerce context, identified criteria were offered to experts in the first place, then final criteria along with proposed strategies are determined and SWOT matrix is drawn as table (2).

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1. unfamiliarity with modern marketing methods (W1) 2. nonconformity of product to customer's needs	1. high quality raw materials and Iranian high quality carpet 2. The direct relationship between buyer and seller without the constraints of place and time (S2)	Strengths and weaknesses
3. use of traditional methods in exports (w3)4. High prices of Iranian carpet (w4).	 Technical experiences in designing and dyeing (S3). The rich history and world renowned qualityofIranian carpet (S4) 	
	6. Skilled human resources (S6)	Opportunities and threats
Strategy 2 (WO) -Use of modern advanced technology and scientific management of hand-woven carpet production to offer carpet with more competitive price (WO1). - the use of new practices for costumer relationship and setting customer network in Internet context in order to recognize their needs more accurately (wo2)	Strategy 1 (SO) 1. The use of available potentials of e-commerce and the potentials for national experienced manpower in the development of carpet market with substantial contribution in global market with Iranian brand (SO1) 2. use of expert and educated force inside the country in order to run e-advertisement and e-marketing at global level and attract potential customer's trust to Iranian prestigious carpet (SO2) 3. Gainingprivate sector and foreign investors' trust in Iranian hand-woven carpet through development of sale market in e- commerce context (SO3)	Strategies (O) 1. Government support for foreign investment and private sector in the carpet industry (O1) 2. developing trend of technology and e-business (O2) 3. The possibility of using information technology in marketing and advertising (O3) 4. Creating new job opportunities (O4) 5. Potential markets (O5)
Strategy 4 (WT) - Gaining Government support for building proper infrastructure and improving e-business space in hand-woven carpet industry (WT1) - Gaining Government support for domestic production and facilitation of Iranian exporters admission conditions to the International business (WT2)	Strategy 3 (ST) - Hiring carpet experts and academically educated individuals to develop the infrastructure of carpet industry information (ST1) - Gaining the government support for hand-woven carpet industry in internal and global arena through employment and foreign exchange earnings (ST2) - use of creative human resource and application of technical experinces in designing, texture, dyeing of hand-woven carpet to confront present rivals in the market (ST3)	 Threats (T) 1. the rise of new rivals such as India, Pakistan, China, and Turkey in the world carpet market 2. political sanctions against Iran (T2) 3. Lack of Iran's membership in World Trade organization (T3). 4. Lack of exporters' sufficient knowledge on e-business, because of lack of business information networks (T4) 5. Lack of Iran's membership in Copy Write Law 6. motivation decline in producing and exporting carpets because of lack of government support (T6) 7. increase in products alternative to hand-woven carpets with lower price such as machine-made carpets, parquet, types of floorings, etc.

Table 2—SWOT matrix in order to determine e-commerce strategies in hand-woven carpet exports

Step 3: designing and sending questionnaires to experts in order to collect data of decision-making matrix In the step, in order to determine the weights of SWOT dimensions and criteria and rank e-commerce, it is essential to collect necessary data in the form of decision making matrix on the part of experts. Thus, the information was collected, as well as designing relevant questionnaire and sending it to 19 experts. Subsequently, the mean expert comment geometry as final decision making matrix was chosen for calculation in accordance with table (3). Table3-decision making matrix

		Т						0					V	V		S						crite	eria
	Т6	T5	T4	T3	T2	T1	05	04	03	02	01	W4	W3	W2	W1	S6	S5	S4	S3	S2	S1	Altern	atives
2 5.	.760	4.913	3.853	4.407	3.453	3.931	4.984	4.180	4.021	3.629	4.615	3.412	4.746	4.017	3.527	4.340	5.278	3.624	3.171	4.807	3.938	SO1	
3.	.798	4.438	3.405	3.353	4.853	3.947	3.611	3.698	4.175	3.802	3.768	4.685	3.241	3.923	5.086	4.710	4.309	3.669	5.828	3.993	3.589	SO2	SO
5 3.	.834	4.324	4.510	3.299	3.263	3.589	4.778	4.319	3.493	4.326	3.963	4.651	3.054	4.792	5.243	5.356	5.502	4.548	3.730	3.722	4.666	SO3	
3.	.907	4.337	3.373	5.044	4.743	4.796	3.412	4.193	4.120	3.802	3.948	3.399	3.909	4.560	2.695	4.170	3.618	4.728	4.879	4.332	3.789	WO1	WO
) 4.	.332	3.660	5.124	5.057	4.546	4.682	4.000	3.359	4.297	5.342	4.583	3.924	5.154	4.544	4.306	5.088	4.750	2.904	2.848	5.262	3.789	WO2	wo
9 4.	.096	4.187	4.681	4.113	3.425	4.219	4.664	4.567	5.063	3.617	4.233	5.026	4.696	5.054	4.867	4.155	4.128	2.625	4.180	4.457	3.397	ST1	
2 4.	.670	3.984	3.510	3.773	3.721	3.492	4.617	3.815	5.315	4.864	5.009	3.322	3.448	3.684	3.512	5.029	4.309	5.801	4.917	4.397	4.106	ST2	ST
5 4.	.944	3.805	4.271	3.996	4.526	5.076	5.747	4.328	3.649	4.090	4.792	4.109	3.665	3.775	3.819	4.212	4.379	2.848	3.651	3.068	4.506	ST3	
3 3.	.948	4.008	4.799	3.925	4.983	2.992	3.616	4.480	5.308	4.170	5.155	3.594	3.459	2.569	3.803	4.874	3.977	3.775	4.485	4.219	4.296	WT1	WT
9 4.	.429	3.976	3.934	4.779	3.779	5.179	3.966	3.990	4.809	4.609	4.659	5.601	3.326	5.539	5.029	3.136	3.884	4.449	4.815	5.015	4.331	WT2	vv 1
		✓																					

 \checkmark Step (4): weighting dimensions and criteria of SWOT matrix using Entropy Shannon method In this stage, in order to weighting each dimension and criteria of SWOT matrix, Entropy Shannon was used. The results obtained from calculation are explained as table 4 suggests

Wj	W _{jk}	Ej	criteria	dimensions	
	0.0179	0.9980	S1		
	0.0389	0.9956	S2		
0.22	0.0804	0.9909	S3	c	
0.32	0.1108	0.9875	S4	3	
	0.0314	0.9965	S5		
	0.0370	0.9958	S6		
	0.0734	0.9917	W1		
0.26	0.0705	0.9920	W		
0.26	0.0603	0.9932	W3	VV	
	0.0602	0.9932	W4		
	0.0195	0.9978	01		
	0.0306	0.9965	O2		
0.15	0.0386	0.9956	O3	0	
	0.0150	0.9983	O4		
	0.0497	0.9944	O5		
	0.0531	0.9940	T1		
	0.0448	0.9949	T2		
	0.0403	0.9954	T3		
0.27	0.0391	0.9956	T4	Т	
	0.0128	0.9986	T5		
	0.0331	0.9963	T6		
	0.0428	0.9952	Τ7		

Table 4—calculating weights of dimensions and criteria of SWOT matrix

✓ Step five: evaluating and ranking strategies based on the weights of criteria and determining preferred strategy using TOPSIS technique

In this stage, after creating weighted scale-free decision-making matrix (as table 5) suggests, the values of positive and negative ideals were determined, and by specifying distance level of each alternative from the values and calculation of their approximation factor, alternatives (strategies of e-commerce) were ranked (table 6).

Table 5: weighted scale free decision making matrix

		Т						0				V	V	S					crite	ria			
Τ7	Т6	Т5	T4	Т3	T2	T1	05	O4	O3	02	01	W4	W3	W2	W1	S6	S5	S4	S3	S2	S1	Alterna	atives
0.066	0.079	0.023	0.044	0.059	0.040	0.061	0.089	0.020	0.044	0.030	0.029	0.052	0.109	0.083	0.068	0.048	0.062	0.115	0.059	0.065	0.022	SO1	
0.034	0.034	0.019	0.034	0.034	0.080	0.062	0.047	0.016	0.048	0.033	0.019	0.098	0.051	0.079	0.141	0.057	0.041	0.118	0.199	0.045	0.018	SO2	SO
0.054	0.035	0.018	0.060	0.033	0.036	0.051	0.082	0.022	0.033	0.043	0.022	0.097	0.045	0.118	0.149	0.074	0.068	0.181	0.082	0.039	0.030	SO3	
0.073	0.036	0.018	0.034	0.077	0.076	0.091	0.042	0.020	0.046	0.033	0.021	0.052	0.074	0.107	0.039	0.045	0.029	0.195	0.140	0.053	0.020	WO1	WO
0.078	0.045	0.013	0.077	0.077	0.070	0.087	0.057	0.013	0.050	0.065	0.029	0.069	0.129	0.107	0.101	0.067	0.050	0.074	0.048	0.078	0.020	WO2	WO
0.085	0.040	0.017	0.065	0.051	0.040	0.070	0.078	0.024	0.070	0.030	0.025	0.113	0.107	0.132	0.129	0.044	0.038	0.060	0.102	0.056	0.016	ST1	
0.058	0.052	0.015	0.036	0.043	0.047	0.048	0.076	0.017	0.077	0.054	0.034	0.050	0.058	0.070	0.067	0.065	0.041	0.294	0.142	0.054	0.024	ST2	ST
0.046	0.058	0.014	0.054	0.048	0.070	0.102	0.118	0.022	0.036	0.038	0.031	0.076	0.065	0.074	0.079	0.046	0.043	0.071	0.078	0.026	0.028	ST3	
0.050	0.037	0.016	0.068	0.047	0.084	0.035	0.047	0.023	0.077	0.040	0.036	0.058	0.058	0.034	0.079	0.061	0.035	0.125	0.118	0.050	0.026	WT1	WT
0.035	0.047	0.015	0.046	0.069	0.048	0.106	0.056	0.018	0.063	0.048	0.030	0.141	0.054	0.158	0.138	0.025	0.034	0.173	0.136	0.071	0.026	WT2	VV 1

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Final ranks	Ci	Si	Si*		
7	0.418	0.187	0.260	SO1	
4	0.488	0.229	0.241	SO2	SO
5	0.469	0.207	0.235	SO3	
2	0.550	0.241	0.197	WO1	WO
9	0.300	0.138	0.321	WO2	wo
10	0.280	0.123	0.317	ST1	
1	0.765	0.327	0.100	ST2	ST
8	0.385	0.179	0.286	ST3	
3	0.515	0.234	0.221	WT1	WT
6	0.423	0.190	0.258	WT2	W1

Table 6—final ranking of e-commerce strategies in hand-woven carpet exports

5. Conclusion and suggestions

On the whole, the effective admission of Iranian hand-woven carpet industry to global markets in e-commerce context requires by far the recognition of business space and adoption of correct strategy in order to contribute to the domain. The article introduces an effective model in order to make more accurate decision and detect and select proper strategy of e-commerce for the country's hand-woven carpet industry. In this model, using SWOT matrix, the analysis of strengths and weaknesses as well as threats and opportunities governing hand-woven carpet export in e-commerce context were undertaken, and using Entropy Shannon and fuzzy TOPSIS techniques, weighting (importance) of dimensions and criteria of the matrix as well as ranking of identified strategies were addressed. The results of internal and environmental conditions of the industry indicated that in the current situation interest in "strengths' took on higher importance (weight) compared to other dimensions. Thus, in determining strategy for e-commerce in the industry, special attention should be paid to this dimension of SWOT matrix. However, the issue does not mean that other aspects of determining e-commerce strategy should be neglected. In addition, the results obtained from the review and analogy of strategies using fuzzy TOPSIS technique indicated that the strategy ST2 takes the first priority. This means that in the present time the internal situation of hand-woven carpet industry in optimal (strengths) conditions in the first place and its external situation stands in an undesirable conditions (threats). In the second place, the adoption of ecommerce strategies "gaining the government support for hand-woven carpet industry" in internal and global arena can substantially contribute to the success of national hand-woven carpet export in international markets in the e-commerce context through employment and foreign exchange earnings.

In interpreting the strategy, we can claim that internal hand-woven carpet industry activists are recommended to prove the contribution of the industry in employment and foreign exchange earnings for the country to the government by a scientific management of the product, so the government should lay the foundation for substantial contribution of national hand-woven traders and activists to new markets in the e-commerce context by providing e-commerce inside the country as well as the effort to return the reputation of Iran's carpet industry in the international communities.

Given the fact that the present study included in few studied conducted on e-commerce strategy area in the country's hand-woven export industry, it is suggested that the subject be investigated at operational levels to in future studies to complete the task, and we can take effective step toward making identified strategies operational by following the patterns of successful countries in hand-woven carpet export via e-commerce.

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