APEM journal
Advances in Production Engineering & Management
Volume 11 | Number 1 | March 2016 | pp 49–58
http://dx.doi.org/10.14743/apem2016.1.209
ISSN 1854-6250
Journal home: apem-journal.org
Original scientific paper

Integration of SWOT and ANP for effective strategic planning in the cosmetic industry

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ABSTRACT

Typically, the decision making processes in cosmetics firms are greatly affected by internal and external factors, which as a result affect firms' success. In this research, the Strengths, Weakness, Opportunities, and Threat (SWOT) analysis was used to identify those factors that affect a cosmetics firm's success and consequently lists the feasible strategy alternatives. The analytic network process (ANP) was adopted for calculating the relative importance for each SWOT factors and sub-factors, while taking into consideration the dependency among SWOT factors, as well as among sub-factors. Utilizing the importance values in the super-matrix, the most preferred strategy in a cosmetic industry is identified, which is to open-up new markets on European market. In conclusion, the SWOT and ANP integration may provide great assistance to strategic planners in determining the best strategy alternative that fulfils the firm's desired objectives.

ARTICLE INFO

Keywords:
Cosmetic industry
Analytic network process (ANP)
SWOT analysis
Strategic planning

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Article history:
Received 9 January 2015
Revised 10 September 2015
Accepted 5 January 2016

1. Introduction

Strategic management is a collection of actions and decisions taken in order to achieve organization's goals and objectives. Decision making process is greatly affected by internal and external factors. Systematic identification and analysis of the effects of such factors on organization success has received significant research attention [1-8]. The Strengths-Weakness-Opportunities-Threats (SWOT) technique is frequently used to analyse internal and external factors, assess the feasible alternative strategies, and then to determine the best one that helps an organization in achieving its desired objectives and goals. Nevertheless, the SWOT analysis as a qualitative tool does not numerically evaluate the effect of each factor on selected strategies [9-11].

The analytic hierarchy process (AHP) method [12-14] is a powerful technique which assists analysts in selecting the best decision among multiple decisions by structuring the decision problem in a hierarchically structure at different levels. In AHP, each level consists of finite number of decision elements, where the upper level of the hierarchy represents the overall goal, while the lower level represents all possible alternatives and the intermediate levels shape the decision criteria and sub-criteria [15-17]. The AHP allows the assessment of factors, which considered as criteria and the alternative strategies by giving them relative weights. Next, pairwise comparisons are carried out between all factors by assigning weights between one (equal importance) to nine (absolutely more important), whereas reciprocal values are assigned to the inverse comparison. Then, for each factor a pairwise comparison is performed between strate-

gies using a scale between one and nine. Finally, the integration between relative weight of factors and strategies are utilized to identify the overall weight of each strategy [18].

The AHP method assumes that there are unidirectional relationships between elements of different decision levels along the hierarchy and uncorrelated elements within each cluster as well as between clusters [19]. As a result, AHP is not appropriate for models that deal with interdependent relationships in AHP. The analytic network process (ANP) is introduced to solve this problem [20-23]. The comparison between AHP and ANP tools is depicted in Fig. 1.

ANP method is an improved version of AHP, which provides more accurate results in complicated problems. In the ANP method and after clearly defined factors, the pairwise comparisons are performed as done by the AHP method; in addition, the dependencies among factors should be examined in pairwise manner. As a final step, the weighted score for each strategy is determined and then used to identify the best strategy.

This research integrates SWOT analysis and ANP technique to determine the best strategy that results in improving the performance of a Jordanian cosmetics sector. The remaining of this research is organized as follows. Section two presents SWOT analysis. Section three introduces the ANP technique. Implementation of the integrated approach is performed in section four. Finally, conclusions are summarized in section five.

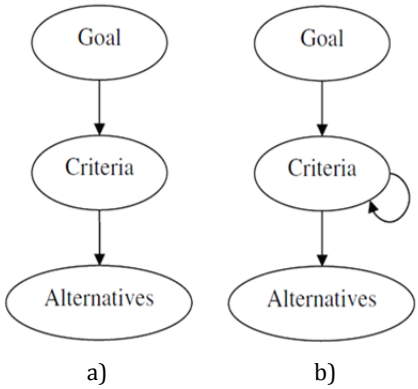

Fig. 1 Hierarchy and network structure: a) AHP, and b) ANP

2. SWOT analysis

The SWOT matrix treats an organization's strengths and weaknesses as internal factors, whereas the threats and opportunities, as external factors. These factors are utilized to identify and formulate strategies by matching the key internal and external factors. The matching between internal and external factors, what is called TOWS, is the most difficult and challenging part in SWOT analysis. TOWS matrix is utilized to develop four types of strategies. These strategies are shown in Fig. 2.

Internal / External	Strengths (S) 1,..., s	Weakness (W) 1,..., w
Opportunities (O) 1,..., o	SO strategies	WO Strategies
Threats (T) 1,..., t	ST Strategies	WT Strategies

Fig. 2 SWOT matrix

The Strengths-opportunities (SO) strategies utilize internal strengths of an organization to take advantage of external opportunities, weaknesses-opportunities (WO) strategies improve internal weaknesses by taking advantage of external opportunities, strengths-threats (ST) strategies use strengths of organization to avoid or minimize the effect of external threats, and weaknesses-threats (WT) strategies are defensive tactics aimed at reducing internal weaknesses and avoiding external threats.

3. ANP analysis

The ANP is used to determine the dependencies and interrelations among factors using four main steps:

Step 1: Clearly state and define the decision model as a network structure shown in Fig. 1.b. Once the goal or objective of the decision model is stated, it would further be decomposed into criteria, sub-criteria, and so on until alternatives level is reached.

Step 2: Establish pairwise comparison matrices and priority vectors. In each factor pairs of decision elements are compared with respect to their relative importance. Then, the factors themselves are compared pairwise with respect to their contribution to the main goal. Furthermore, the interdependencies among elements of each factor are examined pairwise. The pairwise comparison is done by assigning relative importance values (a_{ij}) as shown in Table 1. However, the reciprocal ($a_{ji} = 1/a_{ij}$) of this value is assigned to the inverse comparison.

Table 1 Preference scale as represented by Saaty (1996)

Weight	Definition	Description
1	Equal importance	Factor *i* and *j* are of equally important
3	Moderate importance	Factor *i* is weakly more important than *j*
5	Strong importance	Factor *i* strongly more important than *j*
7	Very strong importance	Factor *i* is very strongly more important than *j*
9	Absolute importance	Factor *i* is absolutely more important than *j*
2, 4, 6, 8	Intermediate values	Represent compromise between the priorities

The pairwise comparison matrix *A*, is represented as follows:

$$A = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1(n-1)} & a_{1n} \\ 1/a_{21} & 1 & & a_{2(n-1)} & a_{2n} \\ \vdots & & \ddots & & \\ 1/a_{1(n-1)} & \cdots & & 1 & a_{(n-1)n} \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1/a_{(n-1)n} & 1 \end{bmatrix} \quad (1)$$

An estimate of the relative importance of the compared factors is determined using Eq. 2.

$$Aw = \lambda_{max} w \quad (2)$$

where *w* is the desired to estimate eigenvector and λ_{max} is the largest Eigen value of *A*.

Step 3: Determine the relative importance of all components with dependency effects and then create the super-matrix. The super-matrix adjusts the relative weights in individual matrices to form a new ''overall'' matrix with the eigenvectors of the adjusted relative weights. That is, the eigenvectors obtained in step 2 are grouped and placed in the appropriate positions in the super matrix in a hierarchy manner as goal, factors, sub-factors and alternatives as follows:

$$W = \begin{bmatrix} 0 & 0 & 0 & 0 \\ W_{21} & 0 & 0 & 0 \\ 0 & W_{32} & 0 & 0 \\ 0 & 0 & W_{43} & I \end{bmatrix} \tag{3}$$

where each entry in W is a matrix. The W_{21} is a matrix which represents the impact of the goal on the factors, W_{32} is a matrix that represents the impact of the factors on each of the sub-factor, W_{43} represents the impact of the sub-factors on each of the alternatives, and I is the identity matrix. If there is any dependency among the factors of W, then W_{22} would be non-zero matrix, and so on. All interdependences can be represented in the same manner.

Step 4: Calculate the weights of alternatives from the normalized super-matrix.

Step 5: Select the alternative that corresponds to the largest priority as the most preferred alternative.

4. Cosmetics industry

The integration of the SWOT and ANP analysis was implemented in cosmetics industry in Jordan and is described as follows. The key internal factors (strengths and weakness) and the most external factors (opportunities and threats) are listed in Table 2. The corresponding ANP structure for cosmetics is shown in Fig. 2. The pairwise comparisons between these factors are presented in Table 3. Then, the matrix W_1, represents the Eigenvector that represents for the SWOT factors is expressed as:

$$W_1 = \begin{bmatrix} 0.547 \\ 0.135 \\ 0.272 \\ 0.047 \end{bmatrix} \tag{4}$$

The dependency among the SWOT factors is analysed by identifying the impact of each factor on the others in pairwise comparison as shown in Table 4. Consequently, the dependency matrix W_2, of the SWOT factors is written as:

$$W_2 = \begin{bmatrix} 1.000 & 0.649 & 0.768 & 0.768 \\ 0.587 & 1.000 & 0.153 & 0.153 \\ 0.324 & 0.295 & 1.000 & 0.079 \\ 0.089 & 0.057 & 0.079 & 1.000 \end{bmatrix} \tag{5}$$

Utilizing Eqs. 4 and 5, the matrix, $W_{factors}$, contains the relative importance of the SWOT factors is determined by multiplying the relative importance matrix W_1, under the assumption of independency by the relative importance matrix W_2, considering the dependency among factors. That is:

$$W_{factors} = W_1 \times W_2 = \begin{bmatrix} 1.000 & 0.649 & 0.768 & 0.768 \\ 0.587 & 1.000 & 0.153 & 0.153 \\ 0.324 & 0.295 & 1.000 & 0.079 \\ 0.089 & 0.057 & 0.079 & 1.000 \end{bmatrix} \times \begin{bmatrix} 0.547 \\ 0.135 \\ 0.272 \\ 0.047 \end{bmatrix} = \begin{bmatrix} 0.880 \\ 0.505 \\ 0.493 \\ 0.125 \end{bmatrix} \tag{6}$$

In Eq. 6, it is noted that the largest importance weight (= 0.880) corresponds to the strengths factor, whereas the smallest weight (0.125) associated with the threats. There is significant difference between the relative weight for each factor with and without considering the dependencies.

Table 2 TOWS matrix for the cosmetic company

		Internal Factors		
		Strength	Weakness	
		1. Human expertise and financial resources. 2. Strong and well-known brand name. 3. Depending on neutral material.	1. Loss of trust from different supply chain parties. 2. Falling in utilizing e-commerce capabilities. 3. Price is expensive. 4. Innovation skills and strong research and development. 5. Better products quality relative to rivals.	
External Factors	**Opportunities**	1. Growing trend in cosmetics industry with 10 % annually. 2. Internet technology is used dramatically to cut cost. 3. Availability of Dead sea mud and salts.	Developing new products consist of neutral material (especially eye makeup).	Utilizing e-trade to marketing their products.
	Threats	1. Increasing import of European products. 2. Increasing cosmetic surgery. 3. Rising taxes of cosmetic products. 4. Competitors are rapidly imitate new product.	Open new market in the European countries by exporting.	Provide different price level to gain multi-segments.

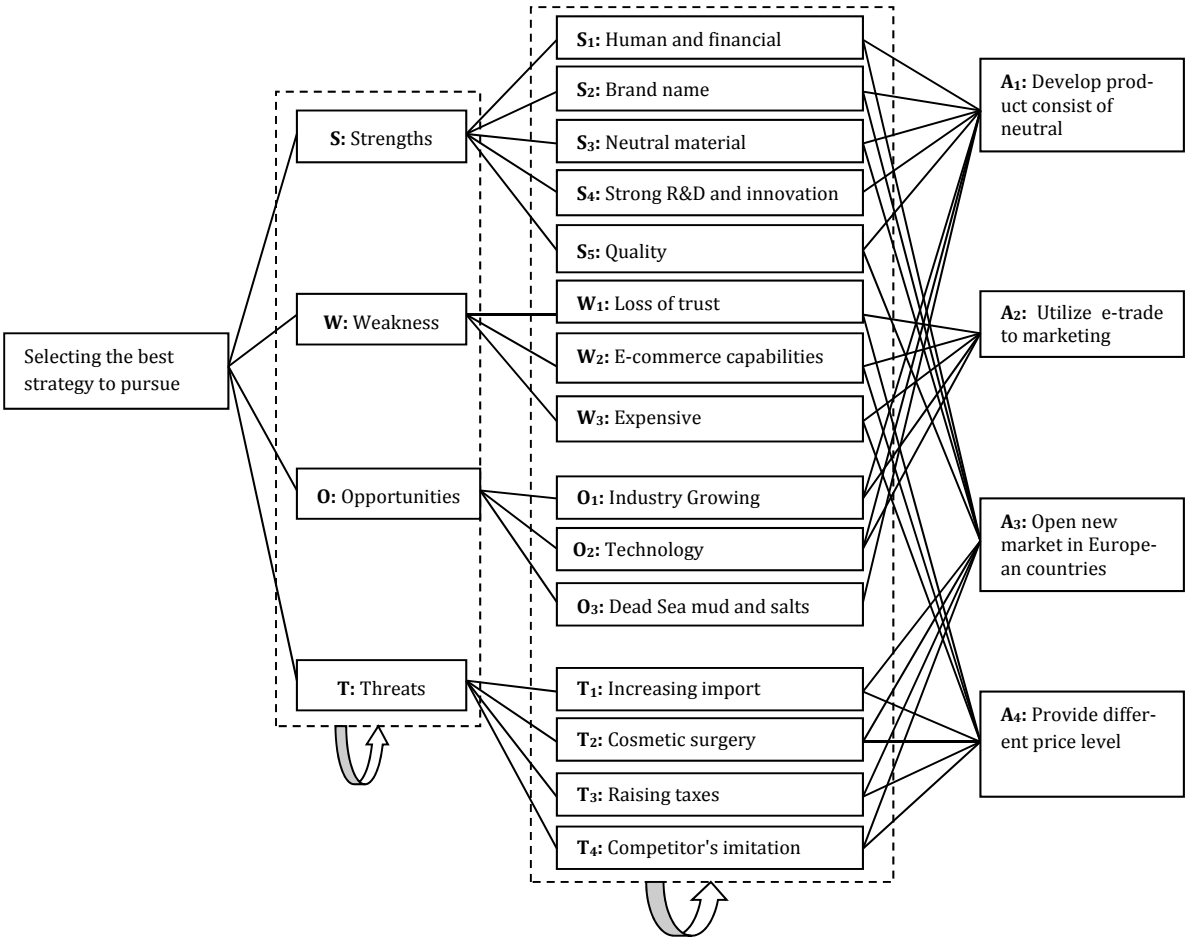

Fig. 3 The ANP model for cosmetics case

Table 3 Pairwise comparison of SWOT factors by assuming independency

SWOT factors	Strengths	Weakness	Opportunities	Threats	4th root of product of values	Eigenvector
Strengths	1	5	3	7	3.200	0.547
Weakness	0.20	1	0.50	4	0.795	0.135
Opportunities	0.33	2	1	9	1.561	0.272
Threats	0.14	0.25	0.11	1	0.269	0.047
				Total	5.825	

Table 4 Dependence matrix of SWOT factors

With respect to	Factors	Weakness	Opportunities	Threats	Importance
Strengths	Weakness	1	2	6	0.587
	Opportunities	0.5	1	4	0.324
	Threats	0.17	0.25	1	0.089
Weakness	Strengths	1	3	9	0.649
	Opportunities	0.33	1	7	0.295
	Threats	0.11	0.14	1	0.057
Opportunities	Strengths	1	9	7	0.768
	Weakness	0.11	1	3	0.153
	Threats	0.14	0.33	1	0.079
Threats	Strengths	1	7	3	0.768
	Weakness	0.14	1	0.2	0.153
	Opportunities	0.33	5	1	0.079

Table 5 Pairwise comparison for SWOT sub-factors

Sub factors	S_1	S_2	S_3	S_4	S_5	W_1	W_2	W_3	O_1	O_2	O_3	T_1	T_2	T_3	T_4	Importance
S_1	1	0.50	4	1	3											0.277
S_2	2	1	0.50	4	2											0.243
S_3	0.25	2	1	9	0.50											0.262
S_4	1.00	0.25	0.11	1	3											0.135
S_5	0.33	0.50	0.33	1	1											0.083
W_1						1	2	0.33								0.230
W_2						0.50	1	0.2								0.122
W_3						3.00	5	1								0.648
O_1									1	8	1					0.533
O_2									0.13	1	0.50					0.117
O_3									1.00	2	1					0.351
T_1												1	3	5	7	0.575
T_2												0.33	1	0.50	2	0.142
T_3												0.20	2	1	4	0.215
T_4												0.14	0.50	0.25	1	0.068

Next, the pairwise comparison among the sub-factors with their corresponding importance values for each SWOT factor is shown in Table 5.

The weighted vectors for the sub-factors, $W_{sf(S)}$, $W_{sf(W)}$, $W_{sf(O)}$, and $W_{sf(T)}$, for the SWOT factors strengths, weaknesses, opportunities, and threats, respectively, are expressed as:

$$W_{sf(S)} = \begin{bmatrix} 0.277 \\ 0.243 \\ 0.262 \\ 0.135 \\ 0.083 \end{bmatrix} \quad W_{sf(W)} = \begin{bmatrix} 0.230 \\ 0.122 \\ 0.648 \end{bmatrix} \quad W_{sf(O)} = \begin{bmatrix} 0.533 \\ 0.117 \\ 0.351 \end{bmatrix} \quad W_{sf(T)} = \begin{bmatrix} 0.575 \\ 0.142 \\ 0.215 \\ 0.068 \end{bmatrix} \tag{7}$$

The weights for the sub-factors W_{sf} are calculated by multiplying the weight of the each SWOT factor in $W_{factors}$ by the corresponding weights of sub-factors. These weights are represented by the following vector:

$$W_{sf} = \begin{bmatrix} 0.277 \times 0.88 = 0.244 \\ 0.243 \times 0.88 = 0.214 \\ 0.262 \times 0.88 = 0.231 \\ 0.135 \times 0.88 = 0.119 \\ 0.083 \times 0.88 = 0.073 \\ 0.230 \times 0.505 = 0.116 \\ 0.122 \times 0.505 = 0.062 \\ 0.648 \times 0.505 = 0.327 \\ 0.533 \times 0.493 = 0.263 \\ 0.117 \times 0.493 = 0.058 \\ 0.351 \times 0.493 = 0.173 \\ 0.575 \times 0.125 = 0.072 \\ 0.142 \times 0.125 = 0.018 \\ 0.215 \times 0.125 = 0.027 \\ 0.068 \times 0.125 = 0.009 \end{bmatrix} \tag{8}$$

To determine the overall weights for sub-factors, the relative weights among SWOT sub-factors are determined by using pairwise comparison matrix. Table 6 shows the pairwise comparisons for the sub-factors with respect to human and financial resources (S_1). The summary of importance values with respect to each of the other sub-factors are displayed in Table 7.

Table 6 Pairwise comparison for sub factors with respect to human and financial resources (S_1)

Sub factors	S_2	S_3	S_4	S_5	W_1	W_2	W_3	O_1	O_2	O_3	T_1	T_2	T_3	T_4	Importance
S_2	1	5	1	6	6	7	1	5	9	6	4	2	3	4	0.167
S_3	0.20	1	3	6	1	5	7	2	4	3	4	9	1	2	0.120
S_4	1.00	0.33	1	5	7	9	2	1	3	3	1	4	3	1	0.115
S_5	0.17	0.17	0.20	1	2	3	7	2	5	2	2	3	4	2	0.069
W_1	0.17	1.00	0.14	0.50	1	5	9	5	7	6	5	2	5	6	0.103
W_2	0.14	0.20	0.11	0.33	0.20	1	4	6	7	9	4	1	7	7	0.082
W_3	1.00	0.14	0.50	0.14	0.11	0.25	1	9	1	2	4	9	6	8	0.083
O_1	0.20	0.50	1.00	0.50	0.20	0.17	0.11	1	3	4	6	8	3	9	0.066
O_2	0.11	0.25	0.33	0.20	0.14	0.14	1.00	0.33	1	7	9	3	2	3	0.048
O_3	0.17	0.33	0.33	0.50	0.17	0.11	0.50	0.25	0.14	1	1	2	4	6	0.029
T_1	0.25	0.25	1.00	0.50	0.20	0.25	0.25	0.17	0.11	1.00	1	1	7	8	0.039
T_2	0.50	0.11	0.25	0.33	0.50	1.00	0.11	0.13	0.33	0.50	1.00	1	4	9	0.034
T_3	0.33	1.00	0.33	0.25	0.20	0.14	0.17	0.33	0.50	0.25	0.14	0.25	1	5	0.025
T_4	0.25	0.50	1.00	0.50	0.17	0.14	0.13	0.11	0.33	0.17	0.13	0.11	0.20	1	0.019

Table 7 Pairwise comparisons between sub-factors

Sub factors	S_1	S_2	S_3	S_4	S_5	W_1	W_2	W_3	O_1	O_2	O_3	T_1	T_2	T_3	T_4
S_1	-	0.192	0.183	0.186	0.187	0.149	0.126	0.125	0.133	0.135	0.154	0.166	0.157	0.146	0.140
S_2	0.167	-	0.127	0.137	0.124	0.124	0.138	0.121	0.122	0.113	0.102	0.127	0.155	0.123	0.122
S_3	0.120	0.119	-	0.089	0.089	0.094	0.102	0.102	0.097	0.097	0.093	0.098	0.107	0.091	0.084
S_4	0.115	0.104	0.095	-	0.072	0.078	0.092	0.101	0.108	0.110	0.100	0.096	0.089	0.107	0.121
S_5	0.069	0.068	0.068	0.067	-	0.096	0.099	0.096	0.100	0.102	0.093	0.081	0.078	0.086	0.084
W_1	0.103	0.108	0.110	0.111	0.091	-	0.092	0.091	0.090	0.083	0.089	0.088	0.086	0.088	0.090
W_2	0.082	0.080	0.077	0.085	0.096	0.103	-	0.080	0.081	0.085	0.084	0.066	0.065	0.072	0.076
W_3	0.083	0.082	0.091	0.081	0.092	0.092	0.092	-	0.069	0.068	0.072	0.062	0.063	0.066	0.066
O_1	0.066	0.060	0.063	0.059	0.068	0.072	0.068	0.070	-	0.042	0.051	0.053	0.047	0.047	0.047
O_2	0.048	0.037	0.037	0.035	0.039	0.038	0.043	0.044	0.030	-	0.037	0.035	0.032	0.036	0.037
O_3	0.029	0.037	0.031	0.039	0.038	0.040	0.039	0.041	0.034	0.035	-	0.036	0.029	0.037	0.039
T_1	0.039	0.035	0.036	0.035	0.026	0.029	0.031	0.036	0.037	0.039	0.036	-	0.034	0.035	0.035
T_2	0.034	0.030	0.032	0.028	0.027	0.025	0.026	0.034	0.037	0.037	0.036	0.036	-	0.040	0.039
T_3	0.025	0.027	0.027	0.026	0.028	0.027	0.028	0.029	0.034	0.034	0.032	0.033	0.039	-	0.022
T_4	0.019	0.020	0.022	0.023	0.023	0.031	0.024	0.030	0.030	0.021	0.020	0.022	0.019	0.025	-

Then, the weight matrix W_3, for the sub-factors is expressed as:

$$W_3 = \begin{bmatrix} 1.00 & 0.19 & 0.18 & 0.19 & 0.15 & 0.13 & 0.13 & 0.13 & 0.13 & 0.14 & 0.15 & 0.17 & 0.16 & 0.15 & 0.14 \\ 0.17 & 1.00 & 0.13 & 0.17 & 0.12 & 0.12 & 0.14 & 0.12 & 0.12 & 0.11 & 0.10 & 0.13 & 0.16 & 0.12 & 0.12 \\ 0.12 & 0.12 & 1.00 & 0.09 & 0.09 & 0.09 & 0.10 & 0.10 & 0.10 & 0.10 & 0.09 & 0.10 & 0.11 & 0.09 & 0.08 \\ 0.12 & 0.10 & 0.10 & 1.00 & 0.07 & 0.08 & 0.09 & 0.10 & 0.11 & 0.11 & 0.10 & 0.10 & 0.09 & 0.11 & 0.12 \\ 0.07 & 0.07 & 0.07 & 0.07 & 1.00 & 0.10 & 0.10 & 0.10 & 0.10 & 0.10 & 0.09 & 0.08 & 0.08 & 0.09 & 0.08 \\ 0.10 & 0.11 & 0.11 & 0.11 & 0.09 & 1.00 & 0.09 & 0.09 & 0.09 & 0.08 & 0.09 & 0.09 & 0.09 & 0.09 & 0.09 \\ 0.08 & 0.08 & 0.08 & 0.09 & 0.10 & 0.10 & 1.00 & 0.08 & 0.08 & 0.09 & 0.08 & 0.07 & 0.07 & 0.07 & 0.08 \\ 0.08 & 0.08 & 0.09 & 0.08 & 0.09 & 0.09 & 0.09 & 1.00 & 0.07 & 0.07 & 0.07 & 0.06 & 0.06 & 0.07 & 0.07 \\ 0.07 & 0.06 & 0.06 & 0.06 & 0.07 & 0.07 & 0.07 & 0.07 & 1.00 & 0.04 & 0.05 & 0.05 & 0.05 & 0.05 & 0.05 \\ 0.05 & 0.04 & 0.04 & 0.04 & 0.04 & 0.04 & 0.04 & 0.04 & 0.03 & 1.00 & 0.04 & 0.04 & 0.03 & 0.04 & 0.04 \\ 0.03 & 0.04 & 0.03 & 0.04 & 0.04 & 0.04 & 0.04 & 0.04 & 0.03 & 0.04 & 1.00 & 0.04 & 0.03 & 0.04 & 0.04 \\ 0.04 & 0.04 & 0.04 & 0.04 & 0.03 & 0.03 & 0.03 & 0.04 & 0.04 & 0.04 & 0.04 & 1.00 & 0.03 & 0.04 & 0.04 \\ 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.04 & 0.04 & 0.04 & 0.04 & 1.00 & 0.04 & 0.04 \\ 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.03 & 0.04 & 1.00 & 0.02 \\ 0.02 & 0.02 & 0.02 & 0.02 & 0.02 & 0.03 & 0.02 & 0.03 & 0.03 & 0.02 & 0.02 & 0.02 & 0.02 & 0.03 & 1.00 \end{bmatrix} \quad (9)$$

Then, the matrix that contains the overall weights of sub-factors $W_{sf\ (overall)}$, is created as follows:

$$W_{sf(overall)} = W_3 \times W_{sf} = \begin{bmatrix} 0.516 \\ 0.449 \\ 0.413 \\ 0.309 \\ 0.235 \\ 0.300 \\ 0.221 \\ 0.461 \\ 0.372 \\ 0.133 \\ 0.238 \\ 0.141 \\ 0.083 \\ 0.084 \\ 0.057 \end{bmatrix} \quad (10)$$

Furthermore, the evaluation of the alternative strategies is performed to determine the best alternative. To do so, the strategies are compared pairwise based on each sub-factors. For illustration, for the first sub-factor S_1, human experts and financial resources, the pairwise comparison among the four alternatives is displayed in Table 8.

Table 8 Pairwise comparison for the alternative strategies based on S_1

Alternative strategies	A_1	A_2	A_3	A_4	Importance
Developing new products (A_1)	1	5	0.5	7	0.329
Utilizing e-commerce (A_2)	0.2	1	0.14	0.5	0.059
Opening new market in Europe (A_3)	2	7	1	9	0.537
Providing different price level (A_4)	0.14	2	0.11	1	0.074

Similarly, the pairwise comparison for the proposed alternative strategies is performed with respect to each of the sub-factors S_1 to T_4. The resulted matrix W_4, of importance values are listed in Eq. 11.

$$W_4 = \begin{bmatrix} 0.329 & 0.514 & 0.461 & 0.583 & 0.404 & 0.121 & 0.139 & 0.209 & 0.537 & 0.121 & 0.426 & 0.209 & 0.127 & 0.045 & 0.242 \\ 0.059 & 0.156 & 0.058 & 0.042 & 0.249 & 0.466 & 0.543 & 0.429 & 0.191 & 0.612 & 0.054 & 0.121 & 0.059 & 0.413 & 0.087 \\ 0.537 & 0.262 & 0.416 & 0.274 & 0.263 & 0.079 & 0.251 & 0.066 & 0.205 & 0.134 & 0.411 & 0.621 & 0.177 & 0.236 & 0.366 \\ 0.074 & 0.068 & 0.064 & 0.101 & 0.084 & 0.334 & 0.067 & 0.296 & 0.066 & 0.041 & 0.109 & 0.050 & 0.637 & 0.306 & 0.305 \end{bmatrix} \quad (11)$$

The second step of alternative evaluation is to calculate the overall weight for each strategy alternative W_{st}, by multiplying importance weight matrix of the alternative strategies $W_{st\ (overall)}$, by the overall weight for sub-factors W_4, as given by Eq. 12.

$$W_{st} = W_4 \times W_{sf(overall)} = \begin{bmatrix} 0.404 \\ 0.680 \\ 0.962 \\ 0.557 \end{bmatrix} \quad (12)$$

Finally, based on the obtained values in Eq. 12, the best strategy that the cosmetic firm should pursue is to open new market in European countries (A_3, weight is 0.962) and exporting cosmetic products that mainly consist of neutral material.

5. Conclusion

Strategic management is collection of decisions adopted to achieve goals and objectives of an organization. This research successfully integrated the SWOT analysis and ANP analysis to assess the feasibility of alternative strategies and identify the best alternative that improves the performance of a Jordanian cosmetics firm. The importance of each SWOT factor is first determined with and without dependency. The super-matrix is created that contains matrices of importance values for factors, sub-factors, and alternatives. Based on the results of SWOT and ANP integration, the best strategy that cosmetic firm should follow is to open new market in European countries. In conclusion, this integration may provide great assistance to strategy planners in selecting the best strategy from a collection of potential feasible strategy alternatives that may bring significant performance improvement to firms in a wide range of applications.

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