Ahmet Ozbek[1,*],
Hakan Pabuccu[2],
Yusuf Esmer[3]

[1] Marmara University,
Faculty of Technology,
Department of Textile Engineering,
Goztepe Campus 34722, Kadikoy – Istanbul, Turkey,
* e-mail: aozbek@marmara.edu.tr

[2] Bayburt University,
Faculty of Economics and Administrative Sciences,
Department of Business,
Dede Korkut Kulliyesi 69000, Bayburt, Turkey

[3] Bayburt University,
Faculty of Applied Sciences,
Department of Management Information Systems,
Dede Korkut Kulliyesi 69000, Bayburt, Turkey

Strategy Development for the Turkish Ready-Made Garment Sector Using SWOT Analysis – Fuzzy TOPSIS Method

Abstract

The aim of this study was to integrate SWOT analysis and the fuzzy TOPSIS method to develop a strategy for the Turkish RMG sector. SWOT analysis was used to determine the strengths &weaknesses and opportunities & threats of the sector. New strategies were developed using SWOT analysis data, and then the fuzzy TOPSIS method was used to rank the strategies for the sector. Four strategies were determined: (1) building global brands, (2) providing government incentives to increase the competitive power of the sector, (3) effective use of e-commerce, and (4) transforming the sector into an attractive business area for young people. Empirical results indicate that the third strategy is ideal for the sector. However, SWOT analysis falls short of determining strategies for any sector. The ability of strategy making processes to yield positive outcomes depends largely on managers' participation in decision-making processes. Fuzzy TOPSIS was used to model the inherent uncertainty in human knowledge and behaviour and to incorporate sector managers' views into the system to assess alternatives that integrate SWOT.

Key words: *RMG sector, strategy development, SWOT analysis, fuzzy TOPSIS.*

Introduction

Exports of the RMG (ready-made garment) sector constitute 3.1% of the total world exports according to 2016 data, indicating the magnitude of the sector. The world's leading exporters of RMG are Asian countries with cheap labour, such as Bangladesh, Vietnam, and especially China, followed by Turkey, which constitutes 3.38% of the total RMG export in the world market [1]. Having been involved in the sector as a subcontractor in the 1980s, Turkey successfully carried on the production of RMG goods until the mid-2000s. However, the intense global competition and domestic dynamics after the mid-2000s significantly transformed the Turkish RMG sector. Since then, it has evolved from a subcontractor to a branding, export- and domestic retail market-oriented sector that manufactures high value-added and expensive products of high quality [2].

The ready garment export capacity of Turkey decreased between 2014 and 2017 but has increased since then. The export volume of RMG is still less than it was in 2014 and has had a share of 11.3% of the total export in the last six years. Although the Turkish economy is growing, the share of RMG is declining, which is mostly due to the decrease in government financial support. Turkey should, therefore, focus on producing high value-added products to increase its export volume [36, 37]. The capacity utilisation rates indicate that the Turkish RMG sector uses about 80% of its production capacity [35].

According to data of the Turkish Social Security Institution (TSSI), the number of formal employees in the RMG sector as of February 2017 is 472,067, which is the highest rate of all 24 manufacturing sectors. Informal employment in the RMG sector (44%) is quite high, which is especially due to intense price competition in the global market. Including informal workers, the RMG sector employs about 1 million people [3]. Given the indicators of investment, production, employment, exports, and added value, the data show that the RMG sector is one of Turkey's most important sectors. However, it should be able to retain its competitive advantage in the face of intense global competition. Therefore, the first thing to do is to determine the strengths & weaknesses and opportunities & threats of the sector [4], because recognizing and promoting strengths provides competitive advantage, while recognizing weaknesses helps to take measures. The RMG sector can also benefit from external opportunities and threats by taking appropriate steps. SWOT analysis is widely used to determine strengths & weaknesses and opportunities & threats.

Derived from the combination of the Classical Greek words "stratos" (meaning general) and "ago" (meaning herding), the word "strategy" is defined as "the path or approach followed to achieve a certain goal." Porter identifies three important principles of strategy: (1) creating a unique and valuable market position with a different set of activities, (2) making trade-offs by choosing "what not to do", and (3) creating "fit" between the activities of an enterprise. Strategy ensures that an enterprise gains a sustainable competitive advantage by maintaining its distinctive features. Strategy means performing activities that are different from those of competitors or performing similar activities in a different way [5]. In this context, companies need to develop strategies to compete with their rivals, achieve long-term goals, and ensure sustainability. Therefore, strategy development is also of great importance for Turkish RMG companies operating in the intense global competition. For the last decade, the Turkish RMG sector has been underperforming and, therefore, losing its luster in the eyes of young and qualified people, which suggests that the Turkish RMG sector lacks strategies for the future.

The aim of this study was to integrate SWOT analysis and the fuzzy TOPSIS method to develop a strategy for the Turkish RMG sector. SWOT analysis falls short of determining strategies for any sector. The ability of strategy making processes to yield positive outcomes depends largely on managers' participation in decision-making processes. Fuzzy TOPSIS has been used to model the inherent uncertainty in human knowledge and behavior and to incorporate sector managers' views into the system to assess

alternatives. Fuzzy TOPSIS has been the method of choice because it uses linguistic variables to model the inherent uncertainty in human knowledge and behavior and has a simple calculation and modelling process.

The study consisted of four sections: The first is a literature review of strategy development and methodological approaches; the second describes the empirical methodology used in the study; the third discusses results, and the final section presents conclusions.

■ Literature review

This study used SWOT analysis and the Fuzzy TOPSIS method to investigate the strengths, weaknesses, opportunities, and threats of the Turkish RMG sector. According to a SWOT analysis of the Turkish RMG sector (Ministry of Industry and Technology, 2014), its strengths are proximity to large markets and raw materials, new machine parks, ease of input, experience and knowledge, a strong production infrastructure, flexible integrated production, an organised logistics infrastructure, fast fashion, small-scale, and original production, while its weaknesses are dependence on the EU, competing with low-priced products, geographical distance to emerging markets, high production costs (labour, energy cost etc.), lack of R&D, insufficient branding, and marketing problems. Its opportunities are effectiveness of sectoral organisations, fashion and brand development, and co-operation between universities and the industry, whilst its threats are the EU's new trade policy, non-tariff barriers, fluctuations in exchange rates, the cheap foreign labor force, and the shift of the workforce to other sectors [6]. No other research has been conducted on the Turkish RMG sector since 2014, which explains why the sector still needs a well-rounded strategy to improve quality. Arslan conducted a SWOT analysis on the Turkish RMG sector and reported its strengths as location, technical, social and administrative know-how, an organized and efficient structure, fully integrated production, young population/qualified work force, production and standardisation in accordance with human and environmental health, EU Customs Union, Free Trade Agreement, fast delivery and logistics, flexible production, new machine parks, development of organised retailing, and world leadership in organic cotton. According to Arslan, its weaknesses are

bureaucracy, lack of institutional cooperation among companies, high production costs, lack of technology, R&D and education policies, dependence on machinery and chemicals, dependence on the EU market, few branding activities, and lack of support for cotton production. Its opportunities are new sanctions by the USA and the EU against China, the future of small stores in Europe, developments in the Russian and Middle Eastern markets, the improved image of Turkish products, and the withdrawal of Europe from production. Its threats are double standards in EU production processes and customs applications, sanctions against Turkish manufacturers, the constant increase in labour costs, and fluctuations in foreign exchange rates [7]. According to Ulas et al., the strengths of the Turkish RMG sector are speed, flexibility, a trained labour force, experience, natural resources, and brand awareness, while its weaknesses are high raw material and energy costs, marketing and distribution problems, economic and political instability, and the lack of strategic partnership. Its opportunities are proximity to the EU market and emerging markets and the development of trade with neighbouring countries, while its threats are the unfair competitive environment created by China, the cost advantage of countries with similar export characteristics, and increased international competition [8]. Saricam et al. used Godet's scenario methodology to develop strategies for the Turkish RMG sector. They created 37 strategies and made some suggestions accordingly. They concluded that low-cost strategies are the most effective ones [9]. Akcagun and Dal used Michael Porter's generic strategies and reported that the most common competitive strategy of the Turkish RMG sector is the overall cost leadership strategy. The companies registered at the Istanbul Chamber of Industry pursue different competitive strategies. Numerous quantitative studies have developed strategies for sectors [10], for example, Ying argued that SWOT analysis and the TOPSIS method are useful tools for strategic analysis and decision-making, respectively [11].

According to Ghorbani et al., SWOT analysis is not capable of determining the importance of factors and of assessing decision alternatives according to those factors. The Fuzzy TOPSIS method and SWOT analysis should, therefore, be used together to determine the priority of strategies [12]. Forghani and Izadi

used SWOT analysis and the VIKOR and TOPSIS methods to select contractors. VIKOR was used to assess and select the best contractor companies. Their model was a strategic method which dealt with the inherent uncertainty in human knowledge and behaviour. They stated that their model can be modified and used for other sectors or companies [13]. According to Alptekin, SWOT analysis fails to draw an accurate picture of strategic decision-making processes. No strategic assessment can be performed using SWOT analysis. It should, therefore, be used together with the TOPSIS method, which allows us to determine the best alternative strategy [14].

Mohamad et al. used the TOPSIS method to prioritise factors in each SWOT category and to rank the strategic choices of the Malay authorities [15]. Trstenjak et al. assessed Croatian national and regional development strategies using Fuzzy TOPSIS, K-Means, and SWOT analysis [16]. Prasad et al. reported that a model based on SWOT analysis and the TOPSIS method was suitable for assessment of the priorities of strategies for the Indian casting industry and could be used for the strategy development processes of other industries as well [17]. Shakerian et al. used a combination of SWOT and Fuzzy TOPSIS analysis to examine the human resource organizational environment and to present organisational strategies [18]. Ajmera integrated SWOT analysis and the TOPSIS method to develop and rank different strategies for the Indian medical tourism sector [19]. Hadavi and Mirabi used a hybrid model consisting of SWOT analysis, the Fuzzy Analytic Hierarchy Process (AHP), a Balanced Scorecard (BSC), and the Fuzzy TOPSIS method to prioritsze SWOT factors and BSC indices based on their relationship with performance metrics affecting a strategic marketing plan at a large Iranian commercial bank. They concluded that the model was suitable for the purpose of the study [20]. Safavian *et al.* [1] integrated SWOT analysis and the TOPSIS method to develop an innovative method to investigate the waste management performance of municipalities. They concluded that TOPSIS-SWOT was a powerful hybrid model [21]. Ervural et al. proposed a hybrid model of SWOT analysis, the Analytic Network Process (ANP), and Fuzzy TOPSIS to develop and rank alternative strategies for Turkey's energy sector and concluded that regional cooperation and geo-strategic position had

the highest priority and that the hybrid model was suitable to develop strategies for the energy sector [22]. In conclusion, SWOT analysis and the Fuzzy TOPSIS method have been used together in strategic management processes (strategic planning, strategy development, strategic decision-making etc.) in many sectors, such as medical tourism, the casting industry, banking, finance, energy and environment.

Advances in information and communication technology have resulted in dramatic changes and increased global competition. Companies or sectors should develop new strategies or update their existing ones to adapt to new situations. The Turkish RMG sector needs new strategies as there has been no development in this regard since 2014. This study proposes an approach and provides some suggestions for managers and shareholders in Turkey.

■ Methodology

Model

The aim of this study was to develop a strategy for the Turkish RMG sector. **Figure 1** presents the research model.

The research model consisted of four stages: (1) determining strengths and weaknesses, (2) forecasting threats and opportunities, (3) determining strategies, and (4) using the fuzzy TOPSIS method to rank the strategies [23].

Methods

Both qualitative and quantitative research methods were used. Data were collected using an open-ended questionnaire. The study sample consisted of two groups of experts. The first consisted of 18 representatives of the RMG sector (sector and project managers, enterprise owners, and entrepreneurs), while the second group consisted of 18 experts (academics, strategists, and CEOs). **Table 1** shows the participants' demographic characteristics. SWOT analysis was used to analyse the data of the representatives. SWOT data were organised to combine and construct an aggregate SWOT matrix. The responses of representatives were combined in terms of frequency, and the researchers developed four strategies representing four dimensions of the analysis. In the second stage of the analysis, fuzzy TOPSIS was used to rank the determinants of SWOT results
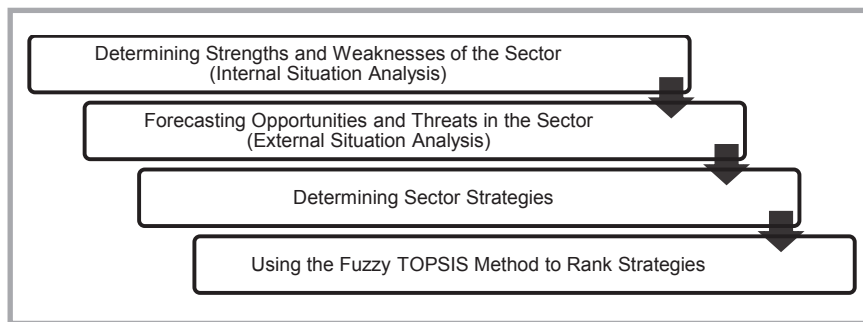
Figure 1. Research model.

depending on the experts' views of the strategy defined. Fuzzy TOPSIS analysis was used to analyse the SWOT data and expert opinions. Fuzzy calculations were used for modelling due to the uncertain and ambiguous structure of the problem. Fuzzy calculation is one of the best modelling approaches especially for expert opinion. SWOT analysis and the fuzzy TOPSIS method are theoretically described below.

SWOT analysis

SWOT analysis is a status matrix used to assess the strengths and weaknesses and opportunities and threats of a project, product, enterprise, or sector, and to help make strategic decisions [24]. It has two types of factors; internal and external. Internal factors are analysed to determine strengths and weaknesses. Strengths i.e. superior characteristics (customer satisfaction, low cost, qualified personnel, advanced technology, etc.) are those that give a sector a competitive advantage. Weaknesses are inferior characteristics

of the existing assets and talent capacity of a sector (obsolete machinery, lack of qualified staff, poor access to developing markets due to distance etc.) that place the sector at a competitive disadvantage. External factors are analysed (external situation analysis) to determine opportunities and threats. Opportunities are characteristics that enable a sector to make more sales and profit than its rivals. Threats are dangers resulting from changes in the distant surrounding of a sector (taxes, quotas, etc.) [25, 26].

SWOT analysis does not measure the importance of factors but only allows for the classification of factors as internal and external within a specific decision context. SWOT analysis, therefore, does not fully assess strategic decision-making processes. This study integrated SWOT analysis and the fuzzy TOPSIS method to find the best strategic alternative. Strategic decision-making is crucial because it enables companies to survive and prosper in today's competitive markets and

Table 1. Demographic information of the first group and second group.

First group		Second group	
Position	Experience	Position	Experience
Export Operation	1	Export Specialist	1
Manager	1	Accounting Manager	1
Project Expert	2	Production Manager	4
Research Specialist	2	E-Trade Executive	4
Export Expert	10	Executive	12
Managing Partner	10	CEO	15
Accounting Expert	10	Accounting Manager	16
Management Organisation Specialist	10	General Secretary	18
Company Owner	12	Managing Director	18
Professor	13	Company Partner	20
Company Owner	14	Customer Department Manager	20
Company Owner	15	Financial Affairs Manager	21
General Secretary	18	General Manager	25
Executive	22	Executive Board Member	25
Production and Finance Manager	22	Company Owner	25
Business Manager	25	Company Owner	30
Company Owner	25	Business Manager	32
Company Owner	30	Foreign Trade Coordinator	34

judge the decisions made by executives to achieve their long-term goals [19].

Fuzzy TOPSIS method

The TOPSIS method is commonly used to solve the problem of selecting and ranking possible alternatives by calculating Euclidean distances. TOPSIS was first developed by Hwang and Yoon (1981) [34]. According to the model proposed, Euclidean distances of alternatives to the positive ideal solution (PIS) minimising cost and maximising benefit should be minimum while their Euclidean distances to the negative ideal solution (NIS) maximising cost and minimising benefit should be maximum. Fuzzy TOPSIS, developed by Chen, Lin, and Huang [2], can model uncertainty problems better by using linguistic expressions and variables. It evaluates alternatives or criteria selected by experts of a given subject matter using linguistic expressions and provides mathematical solutions. Fuzzy TOPSIS steps are as follows [27-30]:

■ Evaluations made by k number of experts using linguistic variables are transformed into fuzzy numbers, the average of which is calculated, and fuzzy decision matrices are constructed. In general, m number of alternatives are evaluated by decision makers according to $A_i = (i = 1, 2, ..., m)$ n number of selection criteria. As $W = [w_1 ... w_n]$, W is the weight vector (**Equations (2)**). As $X = \{x_{ij}, i = 1, 2, ..., m; j = 1, 2, ..., n\}$, X is the decision matrix generated using linguistic variables. The fuzzy decision matrix ($\widetilde{D}$) can be expressed as follows (**Equations (1)**):

$$\widetilde{D} = \begin{matrix} A_1 \\ A_2 \\ A_m \end{matrix} \begin{bmatrix} \widetilde{x_{11}} & \cdots & \widetilde{x_{1n}} \\ \vdots & \ddots & \vdots \\ \widetilde{x_{m1}} & \cdots & \widetilde{x_{mn}} \end{bmatrix} \quad (1)$$

$$W = [W_1 \quad ... \quad W_n] \quad (2)$$

■ The fuzzy decision matrix is transformed into a normalised decision matrix $\widetilde{R}$ using a linear scale transformation. The aim is to compare criteria based on standard values. The normalisation procedure for triangular fuzzy numbers can be performed as follows (**Equations (3)**, **(4)** and **(5)**):

$$\widetilde{R} = [\tilde{r}_{ij}]_{m*n} \quad (3)$$

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_{ij}^+}, \frac{b_{ij}}{c_{ij}^+}, \frac{c_{ij}}{c_{ij}^+}\right) \text{ and } c_j^+ =$$
$$= max_i c_{ij} \text{ if } j \in B \quad (4)$$

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_{ij}^-}, \frac{b_{ij}}{c_{ij}^-}, \frac{c_{ij}}{c_{ij}^-}\right) \text{ and } a_j^- =$$
$$= max_i a_{ij} \text{ if } j \in C \quad (5)$$

where B, is the benefit and C the cost.

■ The weighted normalisation decision matrix is obtained by multiplying the weighted vector by the normalised fuzzy decision matrix.

$$\widetilde{V} = [\tilde{v}_{ij}]_{m*n} \quad (6)$$

$$\tilde{v}_{ij} = \tilde{r}_{ij} * \widetilde{w}_{ij} \quad (7)$$

■ Fuzzy positive ideal solution A^+ and fuzzy negative ideal solution A^- are calculated.

$$A^+ = \{\tilde{v}_1^+, \tilde{v}_j^+, ..., \tilde{v}_m^+\} \quad (8)$$

$$A^- = \{\tilde{v}_1^-, \tilde{v}_j^-, ..., \tilde{v}_m^-\} \quad (9)$$

■ d_j^+ and d_j^- distances of each alternative to $\tilde{v}_j^+$ and $\tilde{v}_j^-$ are calculated, respectively.

$$d_j^+ = \sum_{j=1}^m d_v(\tilde{v}_{ij}, \tilde{v}_j^+) \quad (10)$$

$$d_j^- = \sum_{j=1}^m d_v(\tilde{v}_{ij}, \tilde{v}_j^-) \quad (11)$$

where $d_v(..., ...)$ is the distance between the two fuzzy numbers. It is formulised as follows:

$$d(\widetilde{A_1}, \widetilde{A_2}) =$$
$$\sqrt{\frac{1}{3}[(a_1 - a_2)^2 + (b_1 - b_2)^2 + (c_1 - c_2)^2]} \quad (12)$$

■ In the final step, the proximity coefficient is calculated.

$$CC_i = \frac{d_i^-}{d_i^+ + d_i^-}, i = 1, 2, ..., m \quad (13)$$

SWOT Results

Table 2 shows the interview data as a SWOT Matrix.

The researchers developed strategies representing each dimension of the SWOT analysis. The strengths of the RMG sector show that Turkey is one of the world's biggest exporters and has a high quality production capacity backed by brand power. The first strategy of "building global brands" (SS) represents the strengths of the sector. The weaknesses of the sector are high costs, financial problems, and unethical production. To overcome these problems, the government should promote entrepreneurship and provide financial support. The second strategy of "providing government incentives to increase the competitive power of the sector" (SW) represents the weak-

nesses of the sector. The opportunities of the sector are proximity to important markets, a logistics-transport infrastructure, and the development of the retail sector and e-commerce. Industry 4.0 and the Internet are changing consumer behaviours [31]. Clothing is the largest category in the online retail market worldwide [32]. The third strategy of "effective use of e-commerce" (SO) represents the opportunities of the sector. The threats in the sector are a cheap labour force, decreased investments, fluctuations in the economy, political instability, and the disinterest of young people. Most of them can be regarded as temporary determinants, however, the RMG is a labor intensive sector, and therefore the labour force is one of the most important inputs for it. In line with Pamuk and Erol (2018), the fourth strategy "transforming the sector into an attractive business area for young people" (ST) represents the threats in the sector [33]. These four strategies are described below:

■ Strategy 1 (SS): The Turkish RMG sector became a huge industry thanks to outsourced product orders from the EU in the 1980s. However, this favourable climate changed with the abolition of international trade quotas for apparel products, which were in force until 2008. Due to various disadvantages (high energy, minimum wage etc.), the Turkish RMG sector was unable to compete against contract manufacturing in Asian countries. It should, therefore, make use of its experience and cost advantage and focus on building global brands to compete against fashion and brand producing countries (Italy, Spain, France etc.). Branding will also allow enterprises to produce high added value products with a high profit margin .

■ Strategy 2 (SW): The Turkish RMG sector is composed mostly of small and medium-sized companies with some disadvantages curtailing competition (limited budget, inability to attract qualified people, etc.). Government incentives promote competition, increase production efficiency, and allow for the production of high value-added products [38]. Although, the Turkish government does not provide incentives to private companies [7], it can be an ideal strategy for Turkish RMG companies to attain a competitive advantage.

■ Strategy 3 (SO): Companies should make use of the Internet effectively to

sustain their competitive advantage, to interact with their stakeholders (customers, suppliers, retailers, etc.), to keep up with technological developments (R&D, production, marketing, after-sales services etc.), and to provide up-to-date and accurate data to supply chain members [42-48]. However, research shows that Turkish RMG companies are unable to use the internet effectively, except only for communication.

- Strategy 4 (ST): Companies should determine customer expectations to ensure satisfaction with the right and high value-added products [39-41]. However, qualified college graduates in Turkey tend to avoid the RMG sector due to poor working conditions, low wages, and prejudices. Therefore, making the sector attractive to qualified people can be used as an important strategy to increase competitiveness, as was the case in the early 90s.

Fuzzy TOPSIS Results

Fuzzy TOPSIS analysis was used to rank the four strategies. **Table 3** shows the linguistic variables and their triangular fuzzy number representations. The linguistic terms and their fuzzy representations provide an accurate picture of the experts' opinions.

Table 2. *Turkish RMG sector: SWOT matrix.*

Internal Factors (Internal Situation Analysis)	
Strengths (S)	**Weaknesses (W)**
One of the world's biggest exporters	Failure to meet importers' social compliance and displays unethical production conditions (imitation, knockoff etc.)
Product information (design, collection development, fashion etc.)	Import-dependent production and high import tax rates (fabric etc.)
Organisational skills (on-time delivery, multi-faceted service, etc.)	Failure to meet workforce needs (qualified and unqualified)
High quality production capacity (technological infrastructure, flexible production skill, etc.)	High costs (labour, energy, financing, etc.)
Increasing number of brands and increasing brand power	Failure to finance
Existence of a strong textile sector	Failure of branding at the international level
External Factors (External Situation Analysis)	
Opportunities (O)	**Threats (T)**
Proximity to major markets and logistics transport infrastructure	Market presence of countries with cheap labour and increasing number of producer countries
Employment of foreign workers	Reduced investment in the sector
Acquisition of international brands by Turkish entrepreneurs	Fluctuations in the economy (exchange rate, inflation, etc.)
Developments in the retail sector	Political instability and armed conflicts in the region
Developments in e-commerce	Indifference of the young population to the sector and their unwillingness to work
	Saturated domestic market

Table 3. *Fuzzy linguistic terms and their fuzzy number representations.*

Importance	Abbreviation	Fuzzy Number
Very low	VL	(0, 0, 0.2)
Low	L	(0.05, 0.2, 0.35)
Medium low	ML	(0.2, 0.35, 0.5)
Medium	M	(0.35, 0.5, 0.65)
Medium high	MH	(0.5, 0.65, 0.8)
High	H	(0.65, 0.8, 0.95)
Very high	VH	(0.8, 1, 1)

Table 4. *Evaluation matrix for only one expert.*

Determinants	SS	SW	SO	ST
One of the world's biggest exporters (S1)	High	Very high	Very high	Very high
Product information (design, collection development, fashion etc.) (S2)	Medium	Medium high	High	High
Organisational skills (on-time delivery, multi-faceted service, etc.) (S3)	High	High	High	High
High quality production capacity (technological infrastructure, flexible production skill, etc.) (S4)	High	High	High	High
Increasing number of brands and increasing brand power (S5)	Low	Medium low	Medium high	Medium
Existence of a strong textile sector (S6)	High	Very high	Very high	Very high
Failure to meet importers' social compliance and ethical production conditions (W1)	Medium high	High	Very high	Very high
Import-dependent production and high import tax rates (fabric etc.) (W2)	Medium	Medium high	Very high	High
Failure to meet workforce needs (qualified and unqualified) (W3)	Very high	Very high	Very high	Very high
High costs (labour, energy, financing, etc.) (W4)	Very high	Very high	Very high	Very high
Failure to finance (W5)	Very high	Very high	Very high	Very high
Failure of branding at the international level (W6)	Very high	Very high	Very high	Very high
Proximity to major markets and logistics transport infrastructure (O1)	High	Very high	Very high	Very high
Employment of foreign workers (O2)	Medium low	Medium low	Medium low	Medium low
Acquisition of international brands by Turkish entrepreneurs (O3)	High	High	Very high	Very high
Developments in the retail sector (O4)	High	High	Very high	Very high
Developments in e-commerce (O5)	Very high	Very high	Very high	Very high
Market presence of countries with cheap labour and increasing number of producer countries (T1)	Very high	Very high	Very high	Very high
Reduced investment in the sector (T2)	Very high	Very high	Very high	Very high
Fluctuations in the economy (exchange rate, inflation, etc.) (T3)	Very high	Very high	Very high	Very high
Political instability and armed conflicts in the region (T4)	Very high	Very high	Very high	Very high
Indifference of the young population to the sector and their unwillingness to work (T5)	Very high	Very high	Very high	Very high
Saturated domestic market (T6)	Medium low	Medium	Medium	Medium

Table 5. Ranking of strategies in RMG sector.

	d_j^+ (Distance to PIS)	d_j^- (Distance to NIS)	CC	Ranking
SS	1.150	3.939	0.774	3
SW	1.112	3.947	0.780	2
SO	1.216	3.832	0.759	4
ST	0.973	4.099	0.808	1

All experts expressed their opinions, which were evaluated using the aggregated decision matrix (Appendix A). However, for the sake of brevity, **Table 4** shows only one expert evaluation.

The normalised decision matrix (Appendix B) was calculated with respect to benefit-criteria normalisation. All determinants were assumed to have equal weight. There were no useful comments, and therefore a large number of comments were not made using the collective and normalised decision matrix.

Table 5 shows the ranking of the strategies and their distances to the PIS and NIS. The proximity coefficient (CC) values indicate the performance of the strategies, while the ranking indicates their order of importance. The higher the CC, the better the strategy.

Based on the fuzzy TOPSIS method, the strategies are ranked as follows – ST: Transforming the sector into an attractive business area for young people, SW: Providing government incentives to increase the competitive power of the sector, SS: Building global brands, and SO: Using e-commerce effectively. The strategy (ST) concerning the factors threatening the RMG sector ranks first, while that concerning the weaknesses of the RMG sector ranks second. This suggests that RMG companies should focus on weaknesses and threats.

The study has two limitations: (1) The results are based only on the indicators selected and experts recruited, and therefore they cannot be generalised, and (2) the sample size is small, and therefore a larger sample size might have led to different conclusions. We, however, believe that our results will be useful in better understanding the issue and also pave the way for further research.

Practical implications

The Turkish RMG sector performs contract manufacturing, assembling products of the world's leading brands. As there are many countries that perform contract manufacturing, there is excessive price competition in subcontracting. The sector is trying to reduce labour costs, which is the second largest cost item that provides cost advantage. Due to this, it has been losing its luster in the eyes of employees. If RMG companies manage to put their products on the market, they can afford to pay higher wages to their employees. The sector should, therefore, attract young people. RMG managers should be trained to raise their awareness; courses on branding should be included in the training programmes of textile departments, and the government should support companies to invest in their brands.

The majority of Turkish RMG companies face some challenges because they are mostly small and medium size enterprises (SMEs). They cannot allocate a sufficient budget to marketing activities due to their high labour costs. However, thanks to advances in information and communication technology, the Internet and social media have become important means of marketing, which are more cost-effective than traditional forms of marketing. Companies should be informed about e-marketing and encouraged by the government to invest in it. The Turkish RMG sector has difficulty making any progress in management and marketing. Therefore, colleges should offer management and marketing programs at the undergraduate level to make sure that the RMG sector has the qualified workforce it needs to meet future challenges.

■ Conclusion and discussion

The long-term success of a sector depends on strategic management. To achieve that, its strengths, weaknesses, opportunities, and threats should be identified, and an ideal strategy should be determined. In this respect, strategy development is of great importance for companies in the RMG sector because it helps them gain competitive advantage and judge executive decisions to achieve their long-term goals.

The RMG sector plays a key role in increasing foreign exchange transactions and reducing unemployment in under-developed and developing countries. Therefore, the RMG sector has received a significant amount of investment and achieved a global market share. Contributing to economic growth, the RMG sector is also an important sector in Turkey. However, it has faced numerous challenges in recent years due to liberalisation and globalisation and has been under pressure vis-à-vis low cost producers, which all calls for new strategies. The aim of this study was to perform a strategic analysis of the Turkish RMG sector and to determine the most appropriate strategy for it.

According to the SWOT analysis, the strengths of the Turkish RMG sector are as follows: being one of the world's biggest exporters, owning product information, organisational skills, high quality production capacity, an increasing number of brands, increasing brand power, and the existence of a strong textile sector. Its weaknesses are as follows': failure to meet importers' social compliance, poor ethical production conditions, failure to meet workforce needs, failure to finance, failure of branding at the international level, import-dependent production, and high import tax rates. Sectors that make use of strengths gain a competitive advantage. They should pursue core competence strategies and either improve their strengths or avoid weaknesses to achieve their goals. To do this, they should adopt a reactive approach.

Results indicate that the Turkish RMG sector has such opportunities as proximity to major markets, a logistics-transport infrastructure, the employment of foreign workers, the acquisition of international brands by Turkish entrepreneurs, and developments in the retail sector and e-commerce. However, the threats faced by the Turkish RMG sector are the market presence of countries with a cheap labour, the increasing number of producer countries, reduced investment in the sector, fluctuations in the economy, political instability, armed conflicts in the region, the indifference of the young population to the sector and their unwillingness to work, and a saturated domestic market. Opportunities can provide a significant competitive advantage, and therefore positioning should be pursued as a viable strategy to provide added value. Threats should be identified and controlled to mitigate any possible risks. The Turkish RMG sector should, therefore, adopt a proactive approach.

Four strategies regarding the future of the sector were developed using SWOT analysis. The ideal (first) strategy was "transforming the sector into an attractive business area for young people" (ST). It is no coincidence that ST was the ideal strategy because what the sector needs is design, brand creation and development, and fashion marketing. Educated and creative people are the key to meeting those needs of the sector, which are actually no strangers to it. The RMG sector was the sector of choice for employment among the young population in Turkey in the 1990s, which was also the most profitable period for the sector. ST will help the Turkish RMG sector improve and grow. RMG companies should, therefore, make use of their own assets and abilities to pursue it. Since there is no up-to-date strategy developed for and undertaken by the Turkish RMG sector, we believe that this study will not only contribute to the literature but also guide managers. The second strategy was "providing government incentives to increase the competitive power of the sector (SW),", indicating that more government support is needed to help revive the sector.

Appendix

Table A and B.

References

1. Trade Map. [homepage on the Internet]. 2018. [cited 2018 April 1]. Available from: https://www.trademap.org/Country_SelProduct_TS.aspx?nvpm=1|||||TOTAL|||2|1|1|2|2|1|2|1|
2. Turkish Clothing Manufacturers' Association. Ufuk 2030-Turk Hazir Giyim Sektoru Icin Yol Haritasi, 2016; Istanbul.
3. Sat Sezgin A. Hazir Giyim Sektoru, Turkiye Is Bankasi. Istanbul, 2017.
4. Khaba S. & Bhar C. Quantifying SWOT Analysis for The Indian Coal Mining Industry Using Fuzzy DEMATEL. *Benchmarking: An International Journal* 2017; 24(4), 882-902.
5. Porter M. E. "What Is Strategy?". *Harvard Business Review* 1996; November-December, 1-20.
6. Republic of Turkey Ministry of Industry and Technology. *Turkiye Tekstil, Hazirgiyim ve Deri Urunleri Sektorleri Strateji Belgesi ve Eylem Plani (2015-2018)* 2014; Ankara.
7. Arslan K. Kuresel Rekabet Baskisi Altinda Tekstil ve Hazir Giyim Sektorunun Donusum Stratejileri ve Yeni Yol Haritasi. *MUSİAD Araştırma Raporları* 2008; 57.
8. Erkan B. Determining the International Competitiveness in Turkey's Export of

Table A. *Aggregate evaluation matrix (aggregated fuzzy triangular numbers).*

Determinants	SS			SW			SO			ST		
S1	0.572	0.722	0.850	0.531	0.681	0.808	0.639	0.806	0.883	0.572	0.733	0.828
S2	0.633	0.800	0.900	0.533	0.697	0.806	0.608	0.778	0.869	0.556	0.717	0.811
S3	0.617	0.789	0.872	0.592	0.758	0.858	0.617	0.786	0.878	0.572	0.728	0.839
S4	0.531	0.683	0.803	0.558	0.722	0.831	0.600	0.764	0.872	0.572	0.728	0.839
S5	0.500	0.656	0.789	0.533	0.694	0.811	0.608	0.778	0.869	0.575	0.742	0.842
S6	0.561	0.706	0.828	0.550	0.706	0.815	0.622	0.786	0.872	0.547	0.700	0.819
W1	0.500	0.656	0.788	0.467	0.622	0.756	0.500	0.667	0.767	0.428	0.572	0.694
W2	0.497	0.650	0.769	0.506	0.656	0.783	0.508	0.675	0.775	0.481	0.633	0.753
W3	0.517	0.683	0.783	0.550	0.714	0.822	0.658	0.831	0.914	0.489	0.644	0.756
W4	0.550	0.711	0.828	0.583	0.744	0.861	0.575	0.744	0.836	0.531	0.686	0.797
W5	0.550	0.711	0.828	0.558	0.725	0.825	0.558	0.725	0.825	0.575	0.742	0.842
W6	0.625	0.792	0.892	0.567	0.733	0.833	0.608	0.778	0.869	0.542	0.708	0.808
O1	0.556	0.708	0.828	0.562	0.724	0.838	0.517	0.681	0.789	0.558	0.725	0.825
O2	0.294	0.431	0.578	0.431	0.581	0.708	0.458	0.619	0.736	0.364	0.514	0.642
O3	0.517	0.678	0.794	0.553	0.715	0.829	0.583	0.758	0.833	0.497	0.656	0.758
O4	0.558	0.719	0.836	0.624	0.791	0.888	0.592	0.761	0.853	0.617	0.789	0.872
O5	0.632	0.806	0.885	0.617	0.786	0.878	0.625	0.797	0.881	0.658	0.839	0.897
T1	0.533	0.700	0.800	0.533	0.697	0.806	0.464	0.622	0.725	0.481	0.631	0.758
T2	0.517	0.678	0.794	0.571	0.735	0.841	0.608	0.781	0.864	0.526	0.688	0.803
T3	0.625	0.803	0.869	0.606	0.779	0.859	0.625	0.797	0.881	0.531	0.689	0.792
T4	0.625	0.794	0.886	0.558	0.725	0.825	0.592	0.758	0.858	0.542	0.711	0.803
T5	0.617	0.792	0.867	0.567	0.731	0.839	0.667	0.847	0.906	0.525	0.692	0.792
T6	0.525	0.686	0.803	0.517	0.672	0.806	0.542	0.706	0.814	0.517	0.678	0.794

Table B. *Normalized decision matrix.*

Determinants	SS			SW			SO			ST		
S1	0.648	0.818	0.962	0.601	0.770	0.915	0.723	0.912	1.000	0.648	0.830	0.937
S2	0.704	0.889	1.000	0.593	0.775	0.895	0.676	0.864	0.966	0.617	0.796	0.901
S3	0.703	0.899	0.994	0.674	0.864	0.978	0.703	0.896	1.000	0.652	0.829	0.956
S4	0.608	0.783	0.920	0.640	0.828	0.952	0.688	0.876	1.000	0.656	0.834	0.962
S5	0.575	0.754	0.907	0.613	0.799	0.933	0.700	0.895	1.000	0.661	0.853	0.968
S6	0.643	0.809	0.949	0.631	0.809	0.934	0.713	0.901	1.000	0.627	0.803	0.939
W1	0.634	0.832	1.000	0.592	0.789	0.959	0.634	0.846	0.973	0.543	0.726	0.881
W2	0.635	0.830	0.982	0.645	0.837	1.000	0.649	0.862	0.989	0.613	0.809	0.961
W3	0.565	0.748	0.857	0.602	0.781	0.900	0.720	0.909	1.000	0.535	0.705	0.827
W4	0.639	0.826	0.961	0.677	0.865	1.000	0.668	0.865	0.971	0.616	0.797	0.926
W5	0.653	0.845	0.983	0.663	0.861	0.980	0.663	0.861	0.980	0.683	0.881	1.000
W6	0.701	0.888	1.000	0.636	0.822	0.935	0.682	0.872	0.975	0.607	0.794	0.907
O1	0.663	0.845	0.988	0.670	0.863	1.000	0.616	0.812	0.941	0.666	0.865	0.984
O2	0.400	0.585	0.785	0.585	0.789	0.962	0.623	0.842	1.000	0.494	0.698	0.872
O3	0.620	0.813	0.953	0.664	0.858	0.995	0.700	0.910	1.000	0.597	0.787	0.910
O4	0.629	0.810	0.941	0.702	0.891	1.000	0.666	0.857	0.960	0.694	0.888	0.982
O5	0.705	0.898	0.987	0.687	0.876	0.978	0.697	0.889	0.981	0.734	0.935	1.000
T1	0.662	0.869	0.993	0.662	0.866	1.000	0.576	0.772	0.900	0.597	0.783	0.941
T2	0.598	0.785	0.920	0.660	0.851	0.974	0.704	0.904	1.000	0.609	0.797	0.929
T3	0.710	0.912	0.987	0.688	0.885	0.975	0.710	0.905	1.000	0.603	0.782	0.899
T4	0.705	0.897	1.000	0.630	0.818	0.931	0.668	0.856	0.969	0.611	0.803	0.906
T5	0.681	0.874	0.957	0.626	0.807	0.926	0.736	0.936	1.000	0.580	0.764	0.874
T6	0.645	0.843	0.986	0.635	0.826	0.990	0.666	0.867	1.000	0.635	0.833	0.976

Textile and Apparel Sector. *Anadolu University Journal of Social Sciences* 2013; 13(1), 93-110.

9. Saricam C, Polat S, Cassill N. L. & Kalaoglu F. Strategy Development and Assessment Scenarios for the Turkish Apparel Industry. *FIBRES & TEXTILES in Eastern Europe* 2014; 6(108), 20-26.

10. Akcagun E, Dal V. The Use of M. Porter's Generic Strategies In The Turkish Apparel Industry and Strategy Proposals For Companies. *Tekstil ve Konfeksiyon* 2014; 24(2), 151-157.

11. Ying Y. SWOT-TOPSIS Integration Method for Strategic Decision. Guangzhou, *IEE Computer Society* 2010; 1575-1578.

12. Ghorbani M, Velayati R. & Ghorbani M. M, Using Fuzzy TOPSIS to Determine Strategy Priorities by SWOT Analysis. *Singapore, IACSIT Press* 2011; 11, 135-139.

13. Forghani M. A, Izadi L. Contractor Selection Based on Swot Analysis with Vikor and TOPSIS Methods in Fuzzy Environment. *World Applied Sciences Journal* 2013; 24(4), 540-549.

14. Alptekin N. Integration of SWOT Analysis and TOPSIS Method In Strategic Decision Making Process. *The Macrotheme Review* 2013; 2(7), 1-8.

15. Mohamad D, Syamimi Afandi N, Hanimah Kamis N. Strategic Planning Decision Making Using Fuzzy SWOT-TOPSIS with Reliability Factor. *AIP Conference Proceedings* 2015; 1682(1).

16. Trstenjak B, Kavran A. K, Bujan I. Evaluation of Croatian Development Strategies Using SWOT Analyses with Fuzzy TOPSIS Method and K-Means Methods. *Journal of Economics, Business and Management* 2015; 3(7), 687-693.

17. Prasad S, Khanduja D, Sharma S. K. Integration of SWOT Analysis with Hybrid Modified TOPSIS for The Lean Strategy Evaluation. *Proc IMechE Part B: J Engineering Manufacture* 2016; 232(7), 1295-1309.

18. Shakerian H, Dehnavi HD, Ghanad SB. The Implementation of the Hybrid Model SWOT-TOPSIS by Fuzzy Approach to Evaluate and Rank the Human Resources and Business Strategies in Organizations (Case Study: Road and Urban Development Organization in Yazd) . *Procedia - Social and Behavioral Sciences* 2016; 230, 307-316.

19. Ajmera P. Ranking The Strategies for Indian Medical Tourism Sector through The Integration of SWOT Analysis and TOPSIS Method. *International Journal of Health Care Quality Assurance* 2017; 30(8), 668-679.

20. Hadavi MH, Mirabi V. R. Prioritizing SWOT Factors Using Hybrid model of BSC, SWOT, Fuzzy AHP and Fuzzy TOPSIS Techniques Developed for Use in A Large Iranian Commercial Bank. *International Academic Journal of Business Management* 2017; 4(4), 53-70.

21. Safavian STS, Abdollahi T, Khanzadeh N. Innovative Incorporation of SWOT and TOPSIS (T, SWOT). *Ecology,* *Environment and Conservation Paper* 2017; 23(2), 611-614.

22. Ervural BC, Zaim S, Demirel OF, Aydin Z, Delen D. An ANP and fuzzy TOPSIS-based SWOT Analysis for Turkey's Energy Planning. *Renewable and Sustainable Energy* 2018; 82(1), 1538-1550.

23. Esmer Y, Pabuccu H. Strategic Career Planning: Fuzzy Logic Approach. *İzmir Journal of Economics* 2019; 34(1), 111-124.

24. Hossain K A, MNG Z. SWOT Analysis of China Shipbuilding Industry by Third Eyes. *Recent Advances in Petrochemical Science* 2018; 4(29), 1-10.

25. Gupta M, Shri C, Agrawal A. Strategy Formulation for Performance Improvement of Indian Corrugated Industry: An Application of SWOT Analysis and QSPM Matrix. *Journal of Applied Packaging Research* 2015; 7(3), 60-75.

26. Das M P. SWOT Analysis of Micro, Small and Medium Companies in Rural Society: A Study Conducted in the Ganjam District of Odisha. *International Journal of Scientific Research and Management* 2017; 5(8), 6569-6575.

27. Chen C T, Lin C T, Huang S F. A Fuzzy Approach for Supplier Evaluation and Selection in Supply Chain Management. *International Journal of Production Economics* 2006; 102(2): 289-301.

28. Junior F R L, Osiro L, Carpinetti L C R. A Comparison between Fuzzy AHP and Fuzzy TOPSIS Methods to Supplier Selection. *Applied Soft Computing* 2014; 21, 194-209.

29. Wang T C, Lee H D. Developing A Fuzzy TOPSIS Approach Based on Subjective Weights and Objective Weights. *Expert Systems with Applications* 2009; 36(5), 8980-8985.

30. Wang YJ. The Evaluation of Financial Performance for Taiwan Container Shipping Companies by Fuzzy TOPSIS. *Applied Soft Computing* 2014; 22, 28-35.

31. Ozbek A. The Analysis Of Online Clothing Shopping Of Young Consumers: The Case Of Sinop University Students. *Verimlilik Dergisi* 2018; 4, 135-152.

32. TUIK. Hanehalkı Bilişim Teknolojileri (BT) Kullanım Araştırması. 2018. [cited 2018 April 8]. Available from: http://www.tuik.gov.tr/PreHaberBultenleri.do?id=27819.

33. Pamuk B, Erol S. The Role Of National Strategy and Action Plans On The Development Of Turkish Design Identity. *Social Sciences (NWSASOS)* 2018; 13(2), 76-84.

34. Hwang C L, Yoon K. Multiple Attribute Decision Making: Methods and Application. *Berlin Heidelberg: Springer-Verlag* 1981.

35. Central Bank of the Republic of Turkey. Capacity Utilization Rate of the Manufacturing Industry. [homepage on the Internet]. 2018. [cited 2018 April 1]. Available from: http://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Me-nu/Statistics/Real+Sector+Statistics/Capacity+Utilization+Rate+of+the+Manufacturing+Industry/.

36. Turkish Statistical Institute. Foreign Trade Statistics. [homepage on the Internet].2018. [cited 2018 April 1]. Available from: http://www.turkstat.gov.tr/PreTablo.do?alt_id=1046.

37. Turkish Exporters Assembly. Resarh Reporters. [homepage on the Internet].2018. [cited 2018 April 1]. Available from: http://www.tim.org.tr/en/export-research-reports.html

38. Ozbek, A. Devlet Tesvikleri ve Hazir Giyim Isletmeleri Uzerine Bir Calisma. *Dogu Anadolu Sosyal Bilimlerde Egilimler Dergisi,* 2017; 1(1), 1-14.

39. Sagir, M.Isveren Markasi Algisi: Insan Kaynaklari Faaliyetleri, Calisma Ortami ve Tazminat-Kazanc Boyutlari ile Turizm Fakultelerinde Bir Uygulama. *Mehmet Akif Ersoy Universitesi Sosyal Bilimler Enstitusu Dergisi*, 2016; (14), 415-439. DOI:10.20875/sb.20581.

40. Ozbek A, Esmer Y. A Research On Labor Force Requirement In Turkish Ready-Wear Industry. *AVRASYA Uluslararasi Arastirmalar Dergisi*, 2018; 6, 30-39. doi:https://doi.org/10.33692/avrasyad.509745.

41. Ozbek A. Işletmelerin Musteri Temsilcisinden Nitelik Talepleri; Turk Hazir Giyim Sektoru Uygulamasi. *Uluslararasi Beseri Bilimler ve Egitim Dergisi* 2019; 5(12), 1134-1153.

42. Karaduman I. Stratejik Tedarik Zinciri Yonetimi'nde Bilisim Teknolojileri'nin Kullanimi: Perakendecilik Sektoru'nde Bir Uygulama, Doktora Tezi, Dokuz Eylul Universitesi Fen Bilimleri Enstitusu, Izmir, 2009.

43. Ozbek A. Turk Hazir Giyim Sanayiinde Internet Kullanim Amacinin Belirlenmesi, *Verimlilik Dergisi* 2010; 2, 93-108.

44. Gursoy M. E-Tedarik Zinciri Yonetimi ve Isletmelerin Karsilastigi Sorunlar, *Akademik Bakis Dergisi*, 2013; 36, 1-15.

45. Akbaba AI, Ozdemir A. Kuçuk ve Orta Olçekli Isletmelerin (KOBI'lerin) Pazarlama Faaliyetlerinde Bilgi ve Iletisim Teknolojilerinin Kullanimi ve Bir Uygulama. *International Scientific Conference of Young Researchers*, Qafqaz University, 2013 26-27 April 2013, Baku, Azerbaijan.

46. Aktan E. Yeni Ekonomik Sistemde Elektronik Pazarlama, *Sosyal Bilimler Enstitusu Dergisi*, 2015;1,122-142.

47. Doganlar T. Turkiye'de Elektronik Ticaret Pazari ve Pazarin Gelisimi, Istanbul Ticaret Universitesi, Dis Ticaret Enstitusu, Tartisma Metinleri, 2016; 01, Number; 14.

48. Yuldinawati L, Van Deursen A J, Van Dijk J A. Exploring the Internet Access of Indonesian SME Entrepreneurs. *International Journal of Business* 2018; 23(3), 235-247.