

Strategic SWOT – factor analysis of a textile company – a case study

DOI: 10.35530/IT.074.05.2022137

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ABSTRACT – REZUMAT

Strategic SWOT – factor analysis of a textile company – a case study

SWOT-Factor Analysis of a Textile Company is used to recognize and solve the problem of the constantly changing fashion market and to search for opportunities for the realization of textile products. To analyse the problem of the unresolved economic environment in the textile industry, it needs to follow the policies for sustainable development while developing and showing higher productivity and strengthening its market position. We used a survey and a SWOT-factor matrix. A survey related to the production of textiles and clothing was conducted, and the degree of importance of the respondents' answers and the position they hold in their work organization was determined. A SWOT-factor matrix has been compiled, eliminating the shortcomings of existing solutions in this field. Issues are analysed to describe the strengths and weaknesses of the company. A strategic intensity at level p 0.5 means that the company must adopt a conservative development strategy. A diagram of strategic quadrilateral and a diagram of specific strategies have been drawn up, and recommendations have been made for the company's work in the direction of its effective development. The company must adopt a conservative development strategy. For future work of study, it will be possible to control the actions taken and to give an accurate assessment of the performed analysis over a certain period.

Keywords: firm performance, strategic planning, management, development, sustainability.

SWOT strategic – analiza factorială a unei companii textile – studiu de caz

Analiza factorială SWOT a unei companii textile este folosită pentru a recunoaște și rezolva problema pieței modei în continuă schimbare și pentru a căuta oportunități de realizare a produselor textile. Pentru a analiza problema mediului economic încă nerezolvată din industria textilă, aceasta trebuie să urmeze politicile de dezvoltare durabilă, dezvoltând și manifestând o productivitate mai mare și consolidându-și poziția pe piață. Am folosit un sondaj și o matrice factorială SWOT. A fost realizat un sondaj legat de producția de produse textile și de îmbrăcăminte și a fost determinat gradul de importanță a răspunsurilor respondenților și poziția pe care o dețin în organizarea muncii. A fost alcătuită o matrice factorială SWOT, eliminând dezavantajele soluțiilor existente în acest domeniu. Problemele sunt analizate pentru a descrie punctele forte și punctele slabe ale companiei. O intensitate strategică la nivelul p 0,5 înseamnă că firma trebuie să adopte o strategie de dezvoltare conservatoare. Au fost întocmite o diagramă a patrulaterului strategic și o diagramă a strategiilor specifice și s-au făcut recomandări pentru activitatea companiei în direcția dezvoltării eficiente a acesteia. Compania trebuie să adopte o strategie de dezvoltare conservatoare. Pentru studiile viitoare, va fi posibil să se controleze acțiunile întreprinse și să se ofere o evaluare precisă a analizei efectuate pe o anumită perioadă.

Cuvinte-cheie: performanța firmei, planificare strategică, management, dezvoltare, durabilitate

INTRODUCTION

This study aims to draw up specific strategies and recommendations for the chosen company's work in the direction of its effective development. The strategic plan helps reorganize the company's activities [1] and products to achieve satisfactory profitability and growth [2]. Given the incremental changes in today's business environment, the strategic plan of textile and clothing companies must be created so that strategic activities are in line with trends of the external environment [3]. The strategic analysis describes the internal and external factors of the business environment [4]. The result is a SWOT analysis that can be used for further successful development. Effective management of the textile and clothing business

means choosing the right strategy and implementing it effectively [5].

The development of textile enterprises in southeastern Serbia has been studied to a lesser extent [6]. However, factors influencing manufacturing companies in other regions of the country may have also influenced this region [7]. Therefore, it is necessary to conduct additional research to establish the state of companies producing textiles and clothing in the southeastern region. Of course, this is only one stage of the business planning process, so it is necessary to conduct more in-depth research and analysis to make decisions [8].

The contribution of this paper is to perform a situational analysis of a company related to the production of textiles and clothing from the region of southeastern Serbia using SWOT. Before the methodology

implementation on the concrete case, the theoretical base and general environmental overview are given [9].

OVERVIEW OF THE TEXTILE AND CLOTHING INDUSTRY BUSINESS ENVIRONMENT IN SERBIA

Textile and clothing manufacturing companies are essential in Serbia's economy, employing hundreds of citizens. Moreover, adapting regional economies to the changing competitive environment and introducing new technologies and innovations in textile production lead to the sustainable development of companies. Hence, the strategy needs to create a conceptual model which illustrates the connections among various value chain segments in the clothing and textile sector that lead to the direction of its effective development [10].

The production of textiles and clothing is one of the essential industries in Serbia in terms of production efficiency. However, the textile industry in Serbia faces many problems. For example, leading indicators that precisely show an unresolved economic environment are as follows: economic conflicts, lack of professional staff imposed by the constant “outflow” of experts [11], deindustrialization [13], intense competition from other countries [12], high prices of process equipment [14], a general lack of financial resources [15], insufficient support from banks [16], inadequate supply of modern equipment [17], insufficient commitment and influence of the state in solving its problems [18], a small percentage SMEs with automated production [19].

Besides the high level of expert outflow, this sector encounters the problem of “employee turnover” [20]. The term “employee turnover” is a crucial metric usually central to organizations' workforce planning and strategy [21]. The impact of turnover has received substantial attention from senior management, human resources professionals, and textile engineers in the textile and clothing industry [22]. The issue of employee turnover in organizations in Serbia is an essential element that influences their overall business success [23].

According to [24], there are five productions of textiles and clothing regions in Serbia. Table 1 summarizes the regions in Serbia and what types of textiles or clothing are mainly produced there.

MATERIAL AND METHOD

Material

The companies under study are located in south-eastern Serbia and western Bulgaria. The subject of production is cotton and synthetic fabrics and clothes from them. The company that is analysed annually produces and markets fabrics of different weights and compositions and ready-made knitted garments. The company's main products are sold in the Republic of Serbia, some of them abroad. The total number of employees in the company is 120. The company produces unique work clothes, as clients are government institutions, public and commercial companies, and health centres. The general structure of the company is a Plant for preparations; a Spinning mill; a Weaving factory; Factory finishing fabric. The procedure for conducting a SWOT analysis includes a survey to identify TO-WS factors. The survey must be anonymous. The percentage of employees who participated in the survey is 70%. The company's strategic documents derive the factors used in the TOWS matrix, mass production analysis, sales sector, and human resources policy [25]. TOWS matrix provides a framework to create, compare, decide and access business strategies. It examines a business from an approach that references marketing and administration [26].

Each threat, opportunity, weakness, and strength develops appropriate questions and complete definitions. Threats and opportunities are uncontrollable factors outside the company and often represent trends in the company's level of development. Each list can be reduced to the first four to six factors if necessary. The created groups of questions must be clearly and carefully defined. Weaknesses and strengths are controlled internally by the company from the point of view of competitors and outsiders [27]. Finally, the potential measurements (weighting factors) for each TO-WS combination are determined.

Method

This work follows a methodology that uses the hybrid SWOT-AHP method and the SWOT strategy matrix. Thus, the analysis of strengths, weaknesses, opportunities, and threats (SWOT) will be addressed, with which the Analytic Hierarchy Process, known by its acronym AHP, uses. Ultimately, the SWOT matrix identifies optimal strategies [28].

PCA (Principal Component Analysis) is then used to aggregate the judgments for AHP calculation. AHP

Table 1

TO-WS MATRIX [24]		
External/Internal	Strength (S)	Weakness (W)
Opportunity (O)	SO growth strategies. Use their strengths and use external possibilities.	WO reversed strategy. It takes advantage of external capabilities to overcome its shortcomings.
Threats (T)	ST diversification strategy. It uses its advantages to avoid external threats.	WT's defensive strategy. Overcomes its shortcomings and avoids external threats.

analysis determines the prioritization of progress development [29]. The SWOT method uses two types of analysis: external, which identifies opportunities and threats in the operational environment of the organization, and internal, which seeks to overcome weaknesses through the strengths of the organization. The survey using Google Forms (Google Inc.) collected data on the company's state. This free Google application creates an online form or test. The results are obtained online in real time (figure 1) [30]. In real life, respondents would prefer to answer only a few questions but are willing to fill out a short questionnaire with a small number of questions after being kindly asked to do so. For this reason, the survey was developed, contains a small number of honest, easy, and straightforward questions to respondents, and is suitable for surveying a small number of people. The survey was conducted with employees in the company in two main groups – those in management positions and employees. A total of 83 respondents were interviewed. They are chosen at random, regardless of education and gender. Therefore, all respondents are familiar with the purpose of the survey and the purpose of using the data obtained. The questions included in the survey are shown in table 2. Detailed literature study defines sources and consultations with the representatives of the analysed

enterprise. The weighting factors are calculated based on a five-point scale with possible answers to each question: 1-I strongly disagree; 2-I do not agree; 3-I have no opinion; 4-I agree; 5-I agree. The t-test method verifies statistically significant differences between the groups of respondents. The hypotheses are H0 – no statistically significant differences between the groups; H1 – there is a statistically significant difference between the groups. Reject the null hypothesis if the calculated t is less than $-t$ (critical) or the t-calculated is greater than $+t$ (critical). If $p < \alpha$, the null hypothesis is accepted. All data were processed at a significance level of $\alpha = 0.05$.

Depending on the respondent's answers, the "Factor analysis" method calculated the weighting factors [40]. In this method, the maximum similarity of the factor weights is calculated in the matrix Λ of the factor analysis model:

$$x = \mu + \Lambda f + e \quad (1)$$

where x is the observation vector, μ – vector of average values, Λ – matrix of the dimensions of the weighting coefficients, f – vector of independent, standardized common factors, and e – vector of independent specific factors. X , μ , and e have size d , and f has size m .

Table 2

QUESTIONNAIRES FOR COMPILING A SWOT MATRIX	
Strength (S-questions)	Weakness (W-questions)
S1 Mass production capacity	W1 Work environment-teamwork, pollution, low temperatures, high humidity
S2 Cost-conscious business	W2 Textile engineering skills
S3 Low labour cost	W3 Operative fatigue
S4 Capital investment availability	W4 Effluent treatment capacities
S5 Raw material supply	W5 Availability of water
S6 Supportive management	W6 Fragmented company
S7 High-performance machineries	W7 Slow speed of sample development
S8 Fully managed sales network	W8 High maintenance and service costs
S9 On-time delivery	W9 Lack of accurate forecasting of future trends
S10 Short lead time for product development	W10 Lack of good negotiating skills
Opportunity (O-questions)	Threat (T-questions)
O1 Market orders exports/locals	T1 Ecological product requirement
O2 Common effluent discharge facility	T2 Product lead time
O3 Technical textile	T3 Market competition
O4 New development in dyes, pigments and chemicals	T4 Social ignorance
O5 Low-cost dyes and chemicals	T5 Availability of electrical power
O6 Mass production capacity	T6 High water consumption/effluent generation
O7 Collaboration between industrial and academic organizations	T7 Disposal of solid waste generated from effluent
O8 Technology transfer by company reorganization	T8 High inventory cost
O9 Environmental policy	T9 Global quality standards of the textiles
O10 Production methods that have been successful in the past	T10 Introduction of e-commerce

Data source: Matlab 2017b (The MathWorks Inc., Natick, MA, USA) and Statistica 12 (TIBCO Software Inc., Palo Alto, CA, USA) software products processed the experimental data.

Weighting factors create the SWOT matrix. First of all, the weights of each question are determined. Then, they calculate the relationships between the different groups of questions in the SWOT matrix. The company's market orientation can be obtained based on the quadrant of the centre of gravity in the quadrangle. If the centre is in the first quadrant, the market position is called the zone of aggression, which means that factors S and O are higher than the others. Therefore, the company's work must use advantages and opportunities. Factors O and W are dominant if the centre is in the second quadrant. The market position is called the Development Region. The third quadrant is the regulatory area, which means neutralizing threats and minimizing weaknesses. The transformation zone is in the fourth quadrant, which means using force to neutralize threats. Table 3 describes the possible positions of the surveyed company.

Figure 1 shows the strategic quadrangle and the strategy diagram in general. In addition, the direction of change of the angle θ is indicated.

In the strategic quadrilateral, D denotes the area of the resulting quadrilateral. S and W have expressed through $S(x_1,0)$, $W(-x_2,0)$, and O and T have expressed through $O(0,x_3)$, $T(0,-x_4)$. The coefficients x_1 , x_2 , x_3 , and x_4 represent generalized weights for whole groups of questions S , W , O , and T . The sum of the weights of the four components of the strategic quadrilateral of the graph must be equal

to 1. According to this analysis, the following formulas obtain the centre of gravity (x, y) :

$$x = \frac{x_1 - x_2}{3}; y = \frac{x_2 - x_4}{3} \quad (2)$$

The centre of gravity shows the market position of the company. From here, recommendations can be given for its development.

The areas of the quadrilateral can be calculated as follows:

$$\begin{aligned} OSA &= \frac{x_2 x_1}{2}; STA &= \frac{x_1 x_4}{2}; \\ TWA &= \frac{x_4 x_2}{2}; WOA &= \frac{x_2 x_3}{2}; \end{aligned} \quad (3)$$

When defining specific strategies, a proactive or stable and conservative position can be adopted. Therefore, the strategic intensity must be determined from the same strategy.

A schematic diagram of strategic type and intensity is drawn up. According to the barycentre coordinates, the parameters θ , U , V , and ρ are calculated, respectively. The polar diagram parameters are calculated as follows:

$$\begin{aligned} \theta &= \operatorname{atan}\left(\frac{y}{x}\right); U = x_1 x_3; V = x_2 x_4; \\ \rho &= \frac{U}{U + V}; A(\theta, \rho) \end{aligned} \quad (4)$$

Positive strategic intensity (U) results from the interaction of external circumstances and internal factors.

Table 3

POSSIBLE MARKET POSITION OF THE COMPANY		
Quadrant	Market position	Meaning
O-S	Zone of aggression	The factors S and O are more important than others. Therefore, the company should focus on taking advantage of its strengths and exploiting its capabilities.
O-W	Development zone	The factors O and W are dominant.
T-W	Regulatory area	It was referring to a zone of adjustment. However, first, the company must neutralize threats and minimize its weakness.
T-S	Transformation zone	The company must use forces to neutralize threats.

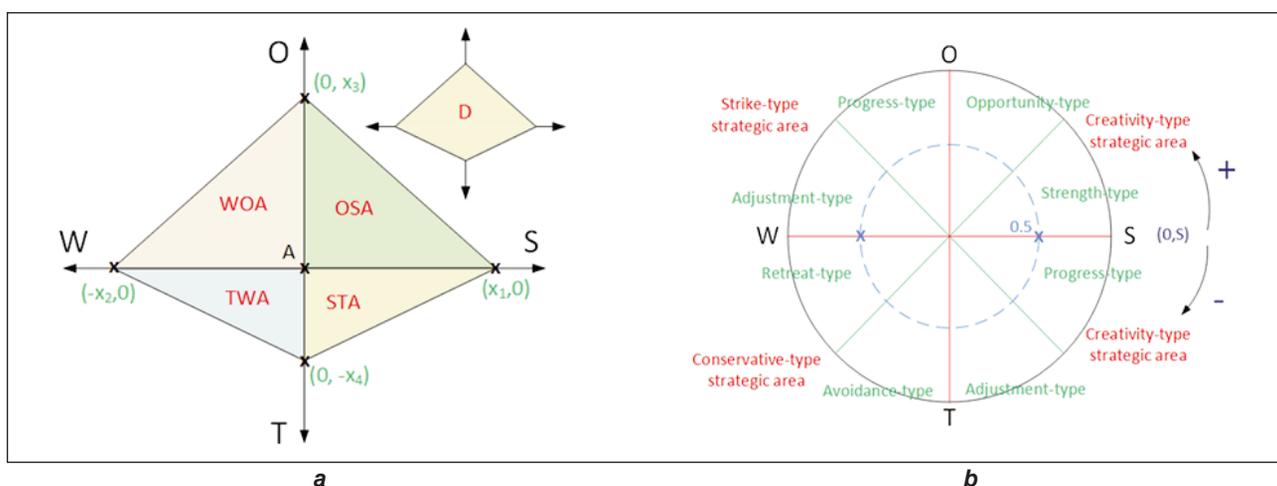


Fig. 1. Strategic diagrams: a – Strategic quadrilateral; b – Diagram to identify specific strategies

Conversely, negative strategic intensity (V) results from the interaction of external threats and internal weaknesses.

What intensity should be adopted depends on the overall positive and negative strategic intensity. We can estimate this by calculating the coefficient of strategic intensity. The strategic intensity factor (ρ) reflects the implementation intensity of the strategic type, $\rho \in (0,1)$.

As the value of U increases, the strategic intensity coefficient increases, indicating that the strategic intensity increases.

When the value of V increases, the strategic intensity coefficient decreases, indicating that the strategic intensity decreases.

Usually, 0.5 is used as a critical point. The operational strategy is adopted at $\rho > 0.5$. At $\rho 0.5$, a conservative strategy is adopted. In the analysis of the SWOT model, the strategic azimuth θ identifies the strategic type and the strategic force coefficient ρ estimates the strategic intensity.

RESULTS AND DISCUSSION

As mentioned above, grouping the results in terms of respondents' responses is the basis for formulating appropriate strategies for the textile company. There was a statistically significant difference in the respondents. A positive analysis of these questions was made, in which there is a statistically significant difference. The SWOT matrix is composed. They analyse the questions in which there is a strong connection

that describes the strengths and weaknesses of the company. A diagram of a strategic quadrilateral and one for a specific strategy were made. These diagrams are analysed. They are recommended for the company's advice regarding effective development.

Table 4 lists the number of respondents who depend on the survey questions' importance and their position in the organization. They are grouped according to strengths, weaknesses, challenges, and threats to the company.

Figure 2 shows a detailed analysis of the questions with a statistically significant difference between the answers of the two groups of respondents. On the S2 issue of Cost-Effective Business, the difference is that one group agrees, and the other entirely agrees that this is their company's strength. This difference shows that both groups of respondents pointed out this feature of the company as necessary, so a collaborative group followed their answers. The same trend is observed in the answers to question S6 about "Maintenance Management". Again, the difference in the answers is that one group agrees, and the other entirely agrees that this is a strength of their company. Again, the following analyses combine the following two groups. One of the company's weaknesses, W3, related to "Operational fatigue", observes differences in the answers of the two groups of respondents. About 40% of respondents are still determining if the company has such a weakness. 30% of the two groups observe contradiction. Respondents in a managerial position believe that

Table 4

NUMBER OF ANSWERS DEPENDING ON THE IMPORTANCE OF THE QUESTIONS																							
P	SV	Management position					Employee					P	SV	Management position					Employee				
		1	2	3	4	5	1	2	3	4	5			1	2	3	4	5	1	2	3	4	5
S1	3	14	6	15	26	3	12	11	22	16	W1	6	0	6	49	3	5	4	9	43	3		
S2	0	3	0	19	42	0	2	8	36	18	W2	0	3	12	43	6	2	5	12	36	9		
S3	0	12	6	27	19	2	12	6	36	8	W3	3	22	29	10	0	6	4	24	28	2		
S4	3	3	9	40	9	1	2	15	39	7	W4	6	6	9	37	6	3	9	11	36	5		
S5	3	3	12	28	18	0	5	11	43	5	W5	3	9	0	46	6	2	8	7	41	6		
S6	3	0	0	37	24	1	5	12	41	5	W6	6	3	6	43	6	1	7	12	41	3		
S7	0	12	6	25	21	4	8	8	31	13	W7	0	26	9	26	3	2	13	14	31	4		
S8	0	3	12	34	15	1	6	9	37	11	W8	3	3	3	16	39	4	4	11	21	24		
S9	0	6	3	46	9	2	1	9	38	14	W9	0	12	15	30	7	5	11	10	32	6		
S10	0	19	22	23	0	4	14	11	28	7	W10	9	27	10	18	0	5	25	6	23	5		
O1	0	12	15	27	10	4	9	12	37	2	T1	3	13	6	36	6	4	7	11	34	8		
O2	0	9	12	36	7	6	5	10	37	6	T2	3	7	0	48	6	0	10	9	38	7		
O3	0	3	9	41	11	1	3	14	22	24	T3	0	16	6	35	7	3	5	10	42	4		
O4	0	9	9	29	17	2	2	12	16	32	T4	3	10	0	45	6	2	7	8	42	5		
O5	0	6	6	29	23	1	3	14	15	31	T5	6	4	3	42	9	1	6	6	47	4		
O6	3	0	9	43	9	2	4	12	26	20	T6	6	11	9	25	13	2	10	7	40	5		
O7	3	25	13	17	6	1	18	14	21	10	T7	6	0	16	36	6	2	7	8	37	10		
O8	3	16	19	16	10	4	18	13	24	5	T8	3	10	16	29	6	1	15	12	27	9		
O9	0	9	13	35	7	1	4	6	41	12	T9	0	6	10	42	6	2	5	13	21	23		
O10	9	13	19	17	6	4	19	11	19	11	T10	3	3	13	30	15	5	5	8	17	29		

Note: PK – Position in the company; SV – importance degree; P – Question

the company does not have such a weakness, while employees believe it is present. The impact of weaknesses in the company is analysed below with appropriate analysis methods.

A SWOT matrix is based on the relationship between the weights of the questions, depending on the respondents' answers. For example, four of the company's strengths are strongly related to three challenges – only one issue of strengths combined with threats to the company.

It is important to note that the most substantial ties are with the company's weaknesses, which combine with challenges and threats. Seven company weaknesses combined with six of the challenges and seven of the threats to it.

Regarding the company's strengths, according to the results obtained, the business's challenges should be focused on producing technical textiles, developing new dyes, and reducing the prices of these products. These challenges are also related to the availability of capital investment. In addition, it needs maintenance management and high-performance machines. Finally, the threats to development in this direction are related to increased costs related to the product's compliance with ecological norms.

The weaknesses observed are related to the working environment, excessive fragmentation of activities in the company, the cost of maintenance of machinery

and equipment, and inaccurate forecasting of trends in the company's field of work.

Threats to overcome these weaknesses of the company are related to competition in the market, increasing the requirements for product quality, but in strict compliance with environmental standards, which in turn leads to increased costs for the company. In addition, social awareness and the introduction of e-commerce methods are threats the company has to deal with.

The coordinates and areas of the strategic quadrilateral are determined. $O = [0 \ 0.26]$; $S = [0.173 \ 0]$; $T = [0 \ -0.287]$; $W = [-0.28 \ 0]$; $OSA = 0.023$; $STA = 0.025$; $TWA = 0.04$; $WOA = 0.036$; $D = 0.124$. The centre of gravity of the company's market position is $(x, y) = [-0.035 \ -0.009]$. Figure 3, a shows the quadrilateral obtained. The largest area it occupies is in the TWA area. It covers 33% of the total area D . This area indicates that the company has weaknesses, the elimination of which is hindered by threats. In addition, this quadrant is located in the regulatory area, meaning the company must neutralize threats and minimize weaknesses.

The coordinates of the diagram for determining specific strategies have been calculated: $\theta = -165.580$ $U = 0.045$ $V = 0.0129$ $\rho = 0.777$ (figure 3, b). The quadrant in which the company is located shows that it must adopt a conservative development strategy and

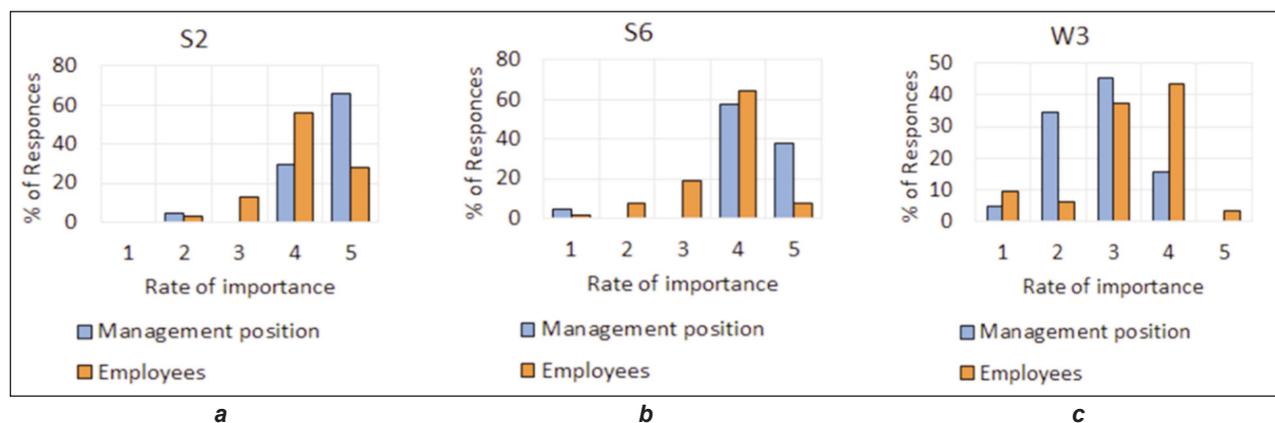


Fig. 2. Questions with a statistically significant difference between the answers of the respondents: a – S2; b – S6; c – W3

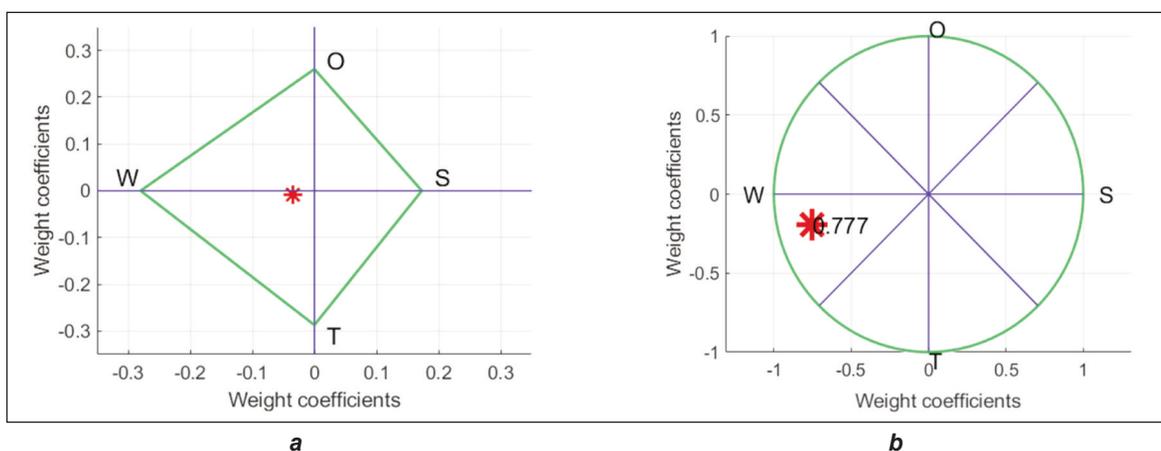


Fig. 1. Strategic diagrams of the studied company: a – Diagram of strategic quadrilateral for the analysed company; b – Diagram for defining specific strategies

protection strategy. This quadrant will ensure sustainable growth using a strategy of a defensive and conservative nature. The strategy will not lead to significant changes but will continue with a stable quota while taking the least risk in a growing market. The value of the coefficient $\rho > 0.5T$ confirms changes, which means that the company must adopt an operational strategy that will simultaneously increase both the operational potential and the market quota.

In summary of the analyses made so far, only three of the questions in the survey showed a statistically significant difference within the methods used for data processing. These questions necessitated further analysis of these three issues. Differences consist of the respondents accepting or fully accepting the questions asked. The two groups of respondents were united, and a general analysis of the market situation in which the company finds itself was made. The company highlights its strengths and weaknesses and its challenges and threats.

From the analyses made, the company has given guidelines for its development. First, it must neutralize threats and minimize its weaknesses. The company must adopt a conservative development strategy. The strategy will ensure its sustainable growth, using defensive and conservative strategies. Also, adopting this strategy would lead to a simultaneous increase in both the operational potential and the market quota of the company.

CONCLUSIONS

The general results of the research are the basis for formulating appropriate strategies for the textile company, which depends on the importance of given answers and the position employees take in the organization in which they work.

There was a statistically significant difference in some of the answers given by the respondents. Few of the company's strengths are strongly related to its challenges. However, the most substantial ties com-

bine the company's weaknesses, challenges, and threats. Furthermore, the business's challenges have focused on producing technical textiles, developing new dyes, and reducing the prices of these products. These challenges are also related to the availability of capital investment. In addition, the company needs maintenance management and high-performance machines. The threats to development in this direction are related to increased costs related to the product's compliance with ecological norms.

This study made an additional analysis of these issues, for which there is a statistically significant difference. Results confirm a statistically significant difference between the manager positions and employees, which is essential for creating specific strategies.

A SWOT-Factor Matrix must recognize their inherent interdependence when considering strengths and weaknesses as independent attributes. Most strengths have corresponding weaknesses. If we manage or mitigate a given weakness, we might also eliminate the corresponding strength.

A diagram of a strategic quadrilateral and one for specific strategies have been drawn up. When analysing the diagrams, the company's work toward its effective development received a recommendation for improving the desired technology transfer to achieve a sustainable and competitive advantage in the textile and clothing market. It was found that the company must adopt a conservative development strategy.

The proposed methods and tools can be used to develop strategies for continuously improving companies operating in textiles and clothing.

ACKNOWLEDGEMENTS

This paper was prepared with the financial support of the Ministry of Education, Science and Technological Development of the Republic of Serbia, with the funding of the scientific research work at the University of Belgrade, Technical Faculty in Bor, according to the contract with registration number 451-03-68/2022-14/ 200131.

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