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An evaluation of financial performance of Vietnam textile and apparel industry using the entropy-TOPSIS method

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Abstract

Vietnam is one of the world's top five exporters of textiles and apparel. Textile and apparel companies not only account for a large amount of foreign currency revenue to the state budget, but also contribute to job creation. Therefore, it is of great importance to learn about the financial stability of this strategic economic industry and the issues needed to be addressed currently or in the future. This study attempts to evaluate 11 Vietnamese textile and apparel companies based on their financial performance using the entropy-TOPSIS method. Seven financial stability ratio data of these companies within the period 2016-2018 were formulated and used for ranking. The ranking shows the degree of their business's financial stability and security. Moreover, the findings may provide company-level managers and industry management officials with insight into the industry's financial stability. Managers can see their financial stability status among others in the industry, while officials can identify companies that need government support for funding or interest rate adjustment.

Keywords: Financial ratios, Textile and apparel companies, Financial performance, Stability ratio, Financial analysis

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1. Introduction

Vietnam's textile and apparel industry has played an essential role in the national economy's development with its notable participation in the formation of GDP, employment, and exports. In 2020, nearly four million employees (8% of the national workforce) are working in the textile and apparel industry. According to the Vietnam General Statistics Office, the textile and apparel sector was among the top exports in 2022 with a value of 32.8 billion USD (Nguyen & Mah, 2023). With recent free trade agreements such as the European Union-Vietnam Free Trade Agreement (EVFTA), Comprehensive and Progressive for Trans-Pacific Partnership (CPTPP), United Kingdom-Vietnam Free Trade Agreement (UKVFTA), and the Regional Comprehensive Economic Partnership (RCEP), Vietnam's textile industry has many opportunities to conquer new markets and expand its market share globally. These opportunities, however, go hand in hand with the need to improve the efficacy of business performances.

To date, there are various studies on the business performances of companies in the textile and apparel industry (Nhat-To, 2022; Wang *et al.*, 2022; Hada *et al.*, 2019; Wang *et al.*, 2017; Anand, 2014; Jung and Hwang, 2011). Findings about enterprises' financial performance allow senior managers to see the real picture of the company's productivity and predict their future development. Anand (2014) used comparative ratio analysis techniques to examine the profitability, liquidity, and solvency of selected Indian textile companies to show how these ratios impacted the company's financial performance. Employing the same method, Jung and Hwang (2011) analyzed Korean textile and apparel companies to learn about their present business conditions. In Vietnam, Wang *et al.* (2017) conducted a study to predict and reflect the condition of textile businesses between 2017 and 2020 to choose strategic alliance partners by applying a hybrid DEA and GM (1, 1) along with criteria such as total assets, selling expenses, general and administration expenses, revenue of sales, and profit after tax. Hada *et al.* (2019) also used data from financial statements to assess the financial performance of Romanian textile firms.

However, research on the financial performance of Vietnam's textile and garment industry is still limited. Therefore, to add to the literature, this study attempts to compare the business performances of 11 Vietnamese textile and apparel companies based on their financial stability ratios within the period of 2016-2018 by using the entropy-TOPSIS method. By doing so, this paper introduces the objective scientific method to the textile industry. The method is a combination of TOPSIS and entropy, in which TOPSIS is a well-known technique used for ranking, and entropy is used to calculate the weight of the criteria. The integration of entropy and TOPSIS helps increase the reliability and accuracy of company evaluation (Celikbilek & Tuysuz, 2020; Zulqarnain *et al.*, 2020). Aside from that, this is a case study of 11 Vietnam textile and garment companies to demonstrate the applicability of the method.

The remainder of this paper is organized as follows. Section 2 explains how the textile and apparel financial ratios are evaluated, along with how the basic ratios are used in previous research. Section 3 introduces how the entropy-TOPSIS method was applied in this research. Section 4 describes and discusses the data analysis results. Finally, section 5 concludes the study.

2. Literature review

2.1 Financial ratios evaluation in textile and apparel business

In business, finance is often used as a common language, and the most essential ratios are financially based (Walsh, 2008). Gallager (2019) also pointed out the benefits of financial ratios in business analysis. Financial managers check the health of businesses by running basic tests such as financial ratio analysis to see whether a firm's performance is within the normal range for a company of that type. A financial ratio is a number that expresses the value of one financial variable relative to another. Financial ratios allow financial analysts to compare information that could not be compared in its raw form. Two ratios may be used for comparison: one ratio to a related ratio, the firm's performance to management's goals, the firm's past and present performances, or the firm's performance to similar firms.

A large and growing body of literature has shown the formulation of a variety of financial ratio evaluations in the textile and apparel industry (Jung and Hwang, 2011; Anand, 2014; Anthony *et al.*, 2019; Fatema *et al.*, 2018; Fayyaz and Nabi, 2016). Jung and Hwang (2011) conducted a financial ratio analysis of Korean textile and apparel companies by collecting data from 41 companies, including 17 apparel and 24 textile companies. To analyze the companies' financial performance, the researchers utilized 14 representative financial ratios, including stability ratios with independent t-test across ten years. The research shows that financial ratio, firstly, is helpful in mutual comparison of the asset or financial structure and revenue or expense structure of businesses of different sizes. Secondly, by observing how a company's asset or financial structure and revenue or expense structure change over certain periods, the real snapshot of the organization's management can be discovered, and its abilities can be examined from many different aspects. Thirdly, financial ratios can be utilized to assess a company's credit risk, predict insolvency, decide credit rating, analyze the intrinsic value of a share, and provide information necessary to prepare estimated financial statements.

In their research, Fatema *et al.* (2018) analyzed the financial performance of the textile sector in Bangladesh by examining the profitability, liquidity, and solvency of textile companies. They adopted a comparative ratio analysis technique to learn the financial soundness of textile companies. The result revealed that the profitability margins are slightly different due to the volatile textiles market and volatility in raw material prices. The liquidity and solvency seemed almost the same in all textile companies. Similarly, Anand (2014) examined three financial ratios, namely profitability, liquidity, and solvency of Indian textile sector, to evaluate its financial performance. Using the comparative ratio analysis technique, the study found that the profitability margins differed slightly due to the volatile textiles market and raw material price volatility; however, the liquidity and solvency positions of all textile companies were nearly identical.

By investigating two textile companies in Pakistan, Fayyaz and Nabi (2016) discovered financial ratios' impact on financial performance by regression analysis and independent t-test technique. They collected the data of two companies, GATM and NML, from standard capital security websites and firms' annual reports for the interval from 2003 to 2017. They analyzed

the return on asset and return on equity with the comparative ratio analysis technique. Besides, they also considered liquidity position, which is measured by current ratio, quick ratio, total asset turnover, fixed asset turnover, inventory turnover, and solvency position by debt to equity debt to total asset and interest coverage ratio. The result also indicated that although both companies were performing better, the NML liquidity position was better than the other's; both insignificantly differed in ROE and fixed asset turnover but had significant differences for the rest.

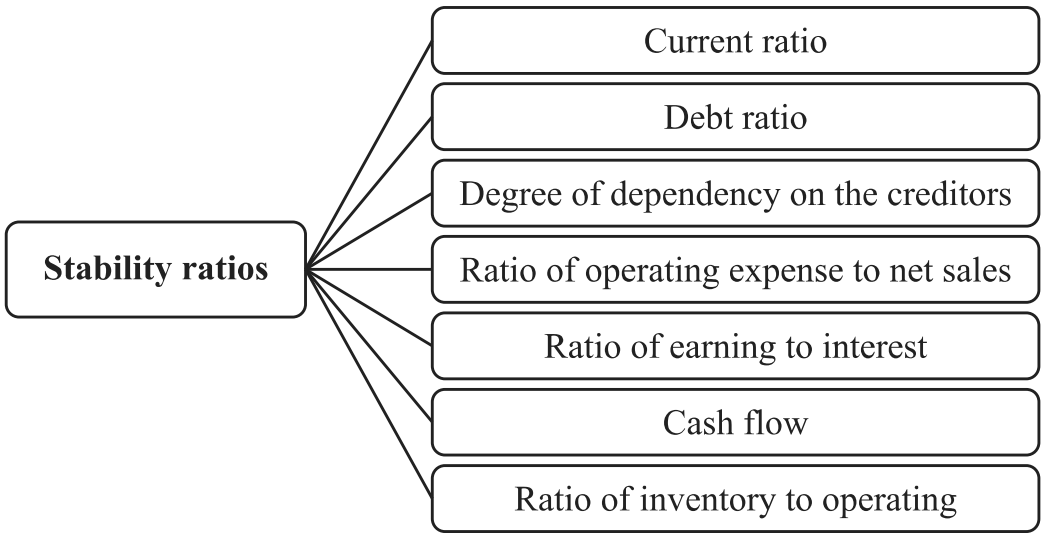

Figure 1. Overview of stability ratio index

Source: Adopted from Jung and Hwang (2011)

Taken together, financial analysis through examining financial ratios helps financial managers, investors, or stockholders have a clear look into the company's performance to develop a more effective strategy to allocate assets or budgets and pay off short-term and long-term debts. Furthermore, financial ratios are an effective tool to evaluate, make comparisons, and figure out which companies have high finance among direct trading competitors.

Realizing the financial ratio analysis as a useful instrument, this study adopted the model of stability ratios used in Jung and Hwang's (2011) research to rank the stability of the Vietnam textile and apparel industry.

2.2 Entropy-TOPSIS method

In 1981, Hwang and Yoon introduced the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). This method is utilized to solve complex decision problems. TOPSIS accepts several inputs which are minimal, and produces outputs that are understandable. Further, any outcome expressed in a non-numerical way should be quantified through the appropriate scaling technique. The principle concept of TOPSIS is that the best solution has the shortest distance to the positive ideal solution (PIS) and the furthest distance from the negative ideal solution (NIS).

In 1947, Shannon proposed the entropy weight method (EWM) deriving from Shannon's entropy model (Shannon and Weaver, 1947). The method's advantage is the elimination of

subjectivity which produces results more in accord with facts. Furthermore, with this method, the index's weight can be identified based on an amount of information.

The advantages of combined entropy-TOPSIS become highly practical for ranking (Memari *et al.*, 2019; Celikbilek and Tuysuz, 2020; Zulqarnain *et al.*, 2020). This approach has been adopted in various areas, for example, business management, design and manufacturing, and energy management. Therefore, it is probably an appropriate method to rank the stability ratios of the Vietnam textile and apparel industry.

3. Method research

3.1 Research framework

Figure 2 demonstrates the evaluation framework. After determining the research subject, the authors selected alternatives which in this case comprised 11 companies in the industry. Then, evaluation indexes of the research were established. There are seven criteria under stability ratios. After that, the data collection was conducted. This step was described in the next section. The most important part of the research process is the entropy-TOPSIS application which includes eight steps. Finally, an evaluation of the industry was revealed.

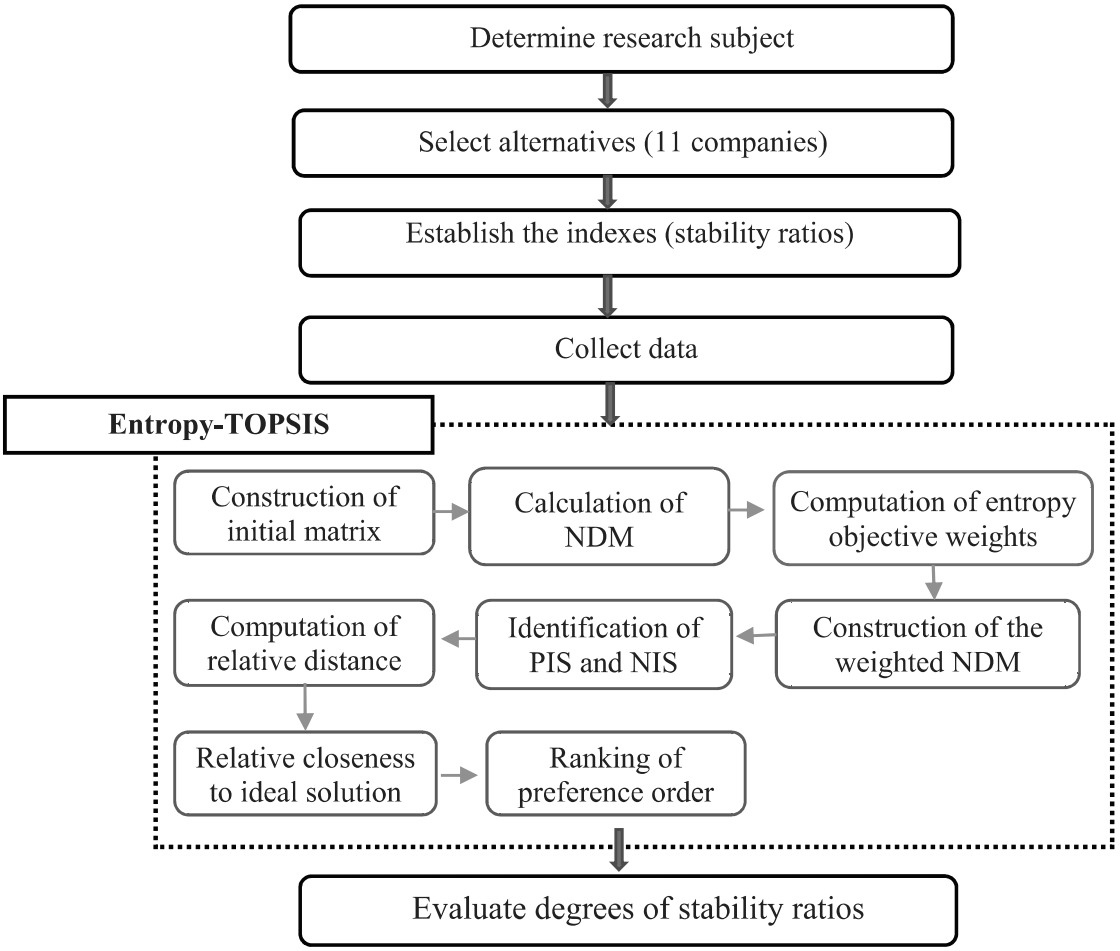

Figure 2. Research framework

Source: Authors' compilation

3.2 Data collection

The top 11 Vietnamese textile and apparel companies were selected from the official website of the Vietnam Textile and Apparel Association. Their names were labeled and presented in Table 1. The data are drawn from the financial statements of these companies in three years from 2016 to 2018. First, calculating individual financial values for individual companies was done for each year. Second, the ratio values in three years are computed. Finally, the average data values were calculated and became the primary data used in this research which are presented in the initial matrix.

Table 1. List of the companies in the textile and apparel industry

Order	Company name codes	Companies names
1	A1	Dong Nai Garment Corporation
2	A2	Garment 10 Corporation J.S.C
3	A3	Ha Noi Textile and Garment J.S.C
4	A4	Hoa Tho Textile–Garment J.S.C
5	A5	Hue Textile Garment Joint J.S.C
6	A6	Hugaco Hung Yen Garment Corporation
7	A7	Nam Dinh Textile Garment J.S.C
8	A8	Nha Be Garment Corporation J.S.C
9	A9	Phong Phu International J.S.C
10	A10	Thang Loi International Garment J.S.C
11	A11	Viet Tien Garment J.S.C

Source: Authors' compilation

3.3 Application of the entropy-TOPSIS method for the industry ranking

The entropy-TOPSIS method consists of eight steps applied for 11 textile and apparel companies (Figure 2) regarding the seven criteria (Figure 1). The research provides insights into how textile and apparel companies in the country have performed for textile industry management officials by using TOPSIS to choose the better company. The selected 11 textile companies (alternatives) were represented by A = {A1, A2, A3,…A11}, and seven financial ratios by C = {C1, C2, C3,…, C7}. This application process is presented in eight steps as the following.

Step 1. Constructing the initial matrix

In this step, an initial evaluation matrix is created with *n* assessment criteria and m alternatives. Then, with the intersection of each alternative and criteria given as x_{ij}, the initial decision matrix *D* is as follows:

$$D = [x_{ij}]_{m\times n} = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}_{m\times n} \end{array}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (1)$$

Step 2. Constructing the normalized decision matrix (NDM)

The initial decision matrix needs to be normalized to form the matrix by using the normalization method.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (2)$$

$$R = [r_{ij}]_{m\times n} = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix} \end{array}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (3)$$

Step 3. Computing the objective weights with entropy

The criteria weights are objectively determined by the information entropy method as follows:

$$e_j = -\frac{1}{\ln m}\sum_{i=1}^{m} r_{ij} \ln r_{ij}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (4)$$

Recalculating the weight of each evaluation criterion as follows:

$$W = (w1, w2, \dots, wn)$$
$$w_j = \frac{1-e_j}{\sum_{j=1}^{n}(1-e_j)}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (5)$$

Step 4. Constructing the weighted normalized decision matrix

According to the normalized decision matrix R and the gained entropy weight w_j, constructing the weighted normalized decision matrix R is as follows:

$$v_{ij} = r_{ij} \times w_j \quad (6)$$

$$V = [v_{ij}]_{m\times n} = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix}_{m\times n} \end{array}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (7)$$

Step 5. Determining the positive ideal and negative ideal solutions

$V^+ = \{v_1^+, v_2^+, \dots, v_n^+\}$ positive ideal solution (8)

$V^- = \{v_1^-, v_2^-, \dots, v_n^-\}$ negative ideal solution (9)

Step 6. Calculating the relative distance for each alternative

The distance from the positive ideal alternative is calculated as follows:

$$S_i^+ = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^+)^2}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (10)$$

The distance from the negative ideal alternative is expressed as follows:

$$S_i^- = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^-)^2}, i = 1,2,\dots,m;\ j = 1,2,\dots,n. \quad (11)$$

Step 7. Calculating the closeness coefficient to the ideal solution Ci

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-}\ 0 \le C_i \le 1\ i = 1,2,\dots,m. \quad (12)$$

The alternative with the best result is the one with the highest C_i value, and the one with the worst result is the one with the lowest C_i value. This means that the alternative that is the furthest away from the negative ideal solution becomes the best outcome. In other words, the best choice is the alternative with the value of C_i closest to 1. The technique's main paradox begins with this proposition. This is only true if the calculations are done in one dimension, as illustrated in Figure 3.

Figure 3. One-dimensional representation

Source: Celikbilek and Tuysuz (2020)

Step 8. Ranking the preference order

The decision-makers can choose the alternatives in ranking order.

4. Results and discussion

Constructing the initial matrix of stability ratios

According to the collected data, the initial decision matrix was created by Equation (1) and presented in Table 2. They are data values of the 11 companies regarding seven research criteria.

Table 2. The initial decision matrix of stability ratios

Companies	Current ratio	Debt ratio	Degree of dependency on the creditors	Ratio of operating expense to net sales	Ratio of earning to interest	Cash flow	Ratio of inventory to operating assets
	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)	(C7)
A1	1.026	2.010	0.392	0.067	3.016	0.146	0.230
A2	1.158	3.501	1.279	0.127	6.573	0.109	0.440
A3	0.873	3.684	0.587	0.067	2.549	0.051	0.475
A4	1.026	3.788	0.534	0.061	4.455	0.014	0.618
A5	1.311	2.337	0.468	0.055	4.653	0.044	0.444
A6	1.628	0.732	0.011	0.287	8.053	0.044	0.102
A7	0.955	4.749	0.643	0.051	2.082	0.021	0.497
A8	0.852	6.524	0.577	0.171	3.104	0.073	0.471
A9	1.226	2.141	1.611	0.102	0.370	0.045	0.411
A10	2.726	0.557	0.005	0.203	5.951	0.217	0.473
A11	1.216	1.883	0.025	0.071	3.302	0.173	0.226

Source: Authors' calculation

Constructing the normalized decision matrix of stability ratios

The normalization matrix was calculated by Equations (2) and (3). The result was presented in Table 3.

Table 3. Normalization matrix of stability ratios

Companies	C1	C2	C3	C4	C5	C6	C7
A1	0.225	0.180	0.160	0.148	0.200	0.412	0.164
A2	0.255	0.314	0.523	0.282	0.437	0.308	0.313
A3	0.192	0.331	0.240	0.149	0.169	0.146	0.338
A4	0.225	0.340	0.218	0.135	0.296	0.042	0.439
A5	0.288	0.210	0.191	0.123	0.309	0.125	0.315
A6	0.358	0.065	0.004	0.637	0.536	0.125	0.073
A7	0.210	0.426	0.262	0.113	0.138	0.061	0.353
A8	0.187	0.586	0.235	0.379	0.206	0.208	0.335
A9	0.270	0.192	0.658	0.227	0.024	0.128	0.292
A10	0.600	0.050	0.002	0.450	0.396	0.614	0.336
A11	0.267	0.169	0.010	0.159	0.219	0.488	0.160

Source: Authors' calculation

Computing the objective weights with entropy

Table 4 revealed objective criterion weights determined by Equations (4) and (5). The following criteria are prioritized in order of importance: current ratio, ratio of inventory to operating assets safety, debt ratio, ratio of operating expense to net sales, cash flow, degree of dependency on the creditors, ratio of earning to interest (W1>W7>W5>W2>W4>W6>W3). The ranking level of "current ratio" is consistent with the literature, which frequently considers this criterion to be the most important.

Table 4. The objective weights with Entropy

Weights	W_1	W_2	W_3	W_4	W_5	W_6	W_7
	0.202	0.147	0.043	0.145	0.158	0.103	0.199

Source: Authors' calculation

Constructing the weighted normalized decision matrix

Following the entropy calculation, Equations (6) and (7) were used to determine the weighted normalized decision matrix of stability ratios (Table 5).

Table 5. The weighted normalized decision matrix

	C1	C2	C3	C4	C5	C6	C7
A1	0.045	0.026	0.006	0.021	0.031	0.042	0.032
A2	0.051	0.046	0.022	0.041	0.069	0.032	0.062
A3	0.039	0.048	0.010	0.021	0.027	0.015	0.067
A4	0.045	0.050	0.009	0.019	0.047	0.004	0.087
A5	0.058	0.030	0.008	0.018	0.049	0.013	0.062
A6	0.072	0.009	0.000	0.092	0.085	0.013	0.014
A7	0.042	0.062	0.011	0.016	0.022	0.006	0.070
A8	0.038	0.086	0.010	0.055	0.032	0.021	0.066
A9	0.054	0.028	0.028	0.033	0.003	0.013	0.058
A10	0.121	0.007	0.000	0.065	0.063	0.063	0.067
A11	0.054	0.024	0.000	0.023	0.034	0.050	0.032

Source: Authors' calculation

Determining the positive ideal and negative ideal solutions

The relative distance for each financial performance of these companies was computed by Equations (8) and (9). The results are expressed in Table 6.

Table 6. The positive ideal and negative ideal solutions

	C1	C2	C3	C4	C5	C6	C7
V+	0.121	0.007	0.000	0.016	0.085	0.063	0.014
V-	0.038	0.086	0.028	0.092	0.003	0.004	0.087

Source: Authors' calculation

Identifying maximum and minimum values as benefit or cost respectively or in reverse depends on the guide of Table 7. This table assists us in putting the right values for benefit and cost for each criterion.

We would like to show how to determine the benefit (V^+) and cost (V^-) out of the whole data values of C1 and C2, for instance. As seen in Table 6, C1 shows that the maximum and minimum values are 0.121 and 0.038, respectively, while C2 shows 0.086 and 0.007, respectively. However, it is necessary to refer to Table 7 when considering which one is benefit and which one is cost. In these two cases, the selected benefit value and the cost one for C1 are 0.121 and 0.038, respectively, whereas the selected benefit value and the cost one for C2 are determined in reverse as 0.007 and 0.086, respectively.

Table 7. Essence of individual ratios for determining benefit values and cost values

Stability ratios			
C1	The **Higher** is the better	C4	The **Lower** is the better
C2	The **Lower** is the better	C5	The **Higher** is the better
C3	The **Lower** is the better	C6	The **Higher** is the better
C4	The **Lower** is the better	C7	The **Lower** is the better

Source: Jung and Hwang, (2011)

Calculating the relative distance for each alternative

According to Equations (10) and (11), relative distances of stability ratios were computed and expressed in Table 8.

Table 8. The relative distance of stability ratios

Positive	S_1^+	S_2^+	S_3^+	S_4^+	S_5^+	S_6^+	S_7^+	S_8^+	S_9^+	S_{10}^+	S_{11}^+
	0.099	0.105	0.131	0.134	0.104	0.103	0.140	0.148	0.130	0.075	0.088
Negative	S_1^-	S_2^-	S_3^-	S_4^-	S_5^-	S_6^-	S_7^-	S_8^-	S_9^-	S_{10}^-	S_{11}^-
	0.120	0.100	0.088	0.094	0.110	0.141	0.085	0.057	0.090	0.148	0.125

Source: Authors' calculation

Calculating the closeness coefficient to the ideal solution C_i

Using Equation (12), all C_i of 11 companies are discovered and expressed in Table 9.

Ranking the preference order

This is the final calculating step to ranking 11 companies based on their C_i values. C_i values were determined by Equation (12) and the ranking results are A10>A11>A6>A1>A5 >A2>A4>A9>A3>A7>A8 (Table 9).

Table 9. Ranking the preference order of stability ratios based on C_i

Companies	C_i	Rank	Companies	C_i	Rank
A1	0.547	4	A6	0.576	3
A2	0.489	6	A7	0.377	10
A3	0.402	9	A8	0.278	11
A4	0.412	7	A9	0.408	8
A5	0.514	5	A10	0.664	1
			A11	0.586	2

Source: Authors' calculation

Although the companies are ranked based on C_i value, individual companies have different strengths and weaknesses. For instance, according to Table 9, A10 ranked first. Besides extremely high financial performance in C1, C2, C3, C5, and C6, some weaknesses still need to be improved in C4 and C7 because the ratio of operating expense to net sales and ratio of inventory to operating assets were below expectations. Its strengths lay in its excelent ability to cover short-term obligations and pay off debt. It faces low risks in terms of debt-load, reducing dependency on the creditors and a small amount of inventory. Actually, the company should pay attention to the two low financial ratios (C4 and C7). To improve the ratio of operating expenses to net sales, financial managers could reduce operating expenses like labor salaries, sales commission, promotional and advertising costs, rental expenses and utilities. The ratio of inventory to operating assets could be improved by forecasting, developing better marketing strategies to increase sales, contacting vendors to reduce inventory prices, or concentrating on top-selling products to improve the inventory turnover ratio.

In contrast, A8 ranked in the lowest position; however, it has relatively good management in C5 and C7. The company was in a safe margin in terms of its interest payment on its debt within a given period. It could also manage inventory effectively and maintain solvency in the short-term. Apart from these strong points, their lowest management levels are in C2, C3, and C4. To improve the operating expense ratio to net sales, the company could reduce operating expenses like labor salaries, sales commission, promotional and advertising costs, rental expenses and utilities. Out of these items, the company should properly impose controls on advertising costs and sales commissions due to the competition.

5. Conclusion

Using the entropy-TOPSIS method, the research has provided insights into how 11 Vietnamese textile and apparel companies performed in terms of financial stability from 2016

to 2018. The company levels are ranked. The top-ranking company (A10) demonstrates a remarkable ability to cover short-term obligations and pay off debt, and has a low debt ratio, low dependence on creditors, and a small amount of inventory; however, this company still needs to improve its ratio of operating expense to net sales and ratio of inventory to operating assets. In contrast, the company that ranked in the lowest position (A6) regarding current assets and debt still had high ratios in other aspects. Apart from this ranking, the research can avoid the subjective factors influences so that the results would be more reliable with entropy. The sorted weights, which were figured out W1>W7>W5>W2>W4>W6>W3, may offer companies in the industry a reference to having a focus on the more weighted standards so that they can promote the performance of finance.

This study points out some solutions to help promote the companies' internal strength. Firstly, managers could improve operating expenses by reducing operating expenses like labor salaries, sales commissions, promotional and advertising costs, rental expenses and utilities. Secondly, managers could improve the cash flow ratio by offering customers discounts for early payment, improving inventory, requiring employees to send invoices out immediately, or convincing their suppliers to offer them a better deal. Thirdly, managers could improve the company's profit by increasing the price of the product, reducing the cost of their product inventory or materials used to produce the products, or reducing the cost of preparing or selling the product. Finally, managers could improve inventory by paying more attention to the forecast, formulating better marketing strategies to increase sales, contacting their vendors to reduce the inventory price, or focusing on top-selling products. The evaluation results can provide the company-level managers and the industry management officials a critical insight into the textile industry's financial problems from which they can have more effective strategies to allocate assets and expand their business. Future research can explore factors affecting textile companies' financial performance or investigate the financial characteristics of firms. It may also be beneficial to conduct further research on developing marketing strategies based on the financial analysis results.

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