



Performance Evaluation of Consumer Products and Services Companies in Malaysia with TOPSIS Model

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Abstract

The consumer products and services sector play a very important role in the development and growth of Malaysia. The consumer products and services sector drives economic growth by producing superior products and offering quality services to customers. The financial performance of these companies has to be assessed in order to achieve continuous improvement, innovation and sustainability. This paper aims to propose a conceptual framework to evaluate the financial performance of the consumer products and services companies with Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) model. TOPSIS is an analytic tool which solves multi-criteria decision making problem. The data of this study consists of five companies which are listed in Bursa Malaysia stock market from year 2013 to 2017. The results of this study show that NESTLE obtained the first ranking, followed by HUPSENG, KAWAN, F&N, and QL. This study is significant as it helps to assess the financial performance of the consumer products and services companies with the proposed conceptual framework based on TOPSIS model. In addition, the financial performance of the companies is ranked accordingly by considering the important financial ratios.

Keywords: Financial performance; Multi-criteria decision making; TOPSIS; Conceptual framework; Financial Ratio

Introduction

Performance evaluation in various sectors has gained considerable attention from the researchers as it helps decision makers to foresee financially relevant future outcomes. The consumer products and services sector drive economic growth by producing superior products and offering quality services to customers. The contribution of the services sector towards the reduction of poverty is significant. It has received recognition from the World Bank [1] and at the same time, it contributes to the growth of gross domestic products (GDP). Therefore, it is important to assess the financial performance of the companies in this sector. Financial health is one of the best indicators for the measurement of the potential of a business in the long run. It gives decision makers an overview of the business performance, allowing them to review their business strategy and make informed decisions. Financial parameters provide reliable measurement and show true reflection of the company performance. Seven important financial ratios have been employed in this study. They are current ratio, return on equity (ROE), profit margin, debt to equity ratio, earnings per share (EPS), dividend yield, and price earnings ratio. The TOPSIS model is utilized in this study to assess the financial performance of the companies based on these financial ratios.

TOPSIS is one of the multi-criteria decision-making (MCDM) tools where it is established with the aim of solving complex multiple criteria problems [2]. It helps decision makers to identify the best alternative out of all the feasible alternatives. It works by assigning weight to each criterion. In addition, TOPSIS model is able to sort and rank all the possible alternatives. The ranking of alternatives can be

done based on their relative distance from the ideal solution. The underlying logic of this technique in the selection of the optimal solution is it has to be the farthest from the negative ideal solution but closest to the positive ideal solution. The distance is calculated based on the Euclidean distance where it considers the relative proximity of each feasible alternative to the optimal solution [3]. In this context, the positive ideal solution consists of all the best value that each criterion can achieve whereas the negative ideal solution is defined as the sum of all the worst value obtained by each criterion. The possible alternatives are then sorted by comparing their relative closeness to the ideal solution. This model eases the decision making process as it is simple, user-friendly, and most importantly, it facilitates the measurement of the performance of the alternatives [3-5].

There have been an increasing number of subsequent studies that applies TOPSIS model extensively to solve many MCDM problems. According to the past studies, TOPSIS model has been employed by researchers from various fields such as the education field [6], automotive industry [7, 8], sports [9], supply chain [10-12], banking sector [13], fast food restaurants [14], mobile network operators [15, 16] and technology companies [17].

The objective of this study is to propose a conceptual framework to evaluate the financial performance of the consumer products and services companies with TOPSIS model. The remaining part of this paper is organized as follows. The following section presents the data and methodology used in this study. Section 3 discusses the results obtained from model and the last section is the conclusion of the study.

Data and Methodology

The data of this study consists of the consumer products and services companies which are listed in Bursa Malaysia stock market [18]. The data of the companies are obtained from year 2013 to 2017. Malaysia economic recorded growth as domestic demand strengthen and rebound in exports. The consumer products which consist of manufacturing of consumer goods have contributed to Malaysia's economic growth. Malaysia's private consumption seen accelerated growth rate since year 2012 which was driven by favourable wages and employment growth [19]. Table 1 presents the proposed conceptual framework to evaluate the financial performance of the consumer products and services companies with TOPSIS model.

Table 1: Proposed Conceptual Framework

Decision Criteria (Financial ratios)	Decision Alternatives (Consumer products and services companies)
Current ratio (CR)	F&N
Return on equity (ROE)	HUPSENG
Profit margin (PM)	KAWAN
Debt to equity ratio (DER)	NESTLE
Earnings per share (EPS)	QL
Dividend yield (DY)	
Price earnings ratio (PER)	

Seven financial ratios are analyzed in this study to reflect the financial viability of the business. The financial ratios used in this study are current ratio (CR), return on equity (ROE), profit margin (PM), debt to equity ratio (DER), earnings per share (EPS), dividend yield (DY), and price earnings ratio (PER). The data covers a period of five years from 2013 to 2017.

TOPSIS model is developed to address MCDM problems where it helps to identify the best alternative based on multiple criteria. The procedure of the implementation of TOPSIS model is described below.

Step 1: Build a decision matrix.

The decision matrix consists of n criteria and m decision alternatives.

$$x_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \quad (1)$$

Step 2: Build a normalized decision matrix (R).

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

$$R_{ij} = \begin{bmatrix} r_{11} & \dots & r_{1n} \\ \vdots & \ddots & \vdots \\ r_{m1} & \dots & r_{mn} \end{bmatrix} \quad (3)$$

Step 3: Construct a weighted normalized decision matrix (V). The financial ratios are equally important in the evaluation of financial performance [20, 21].

$$W = (w_1, w_2, \dots, w_n) \text{ where } \sum_{j=1}^n w_j = 1 \quad (4)$$

$$V_{ij} = \begin{bmatrix} w_1 r_{11} & \dots & w_n r_{1n} \\ \vdots & \ddots & \vdots \\ w_1 r_{m1} & \dots & w_n r_{mn} \end{bmatrix} \quad (5)$$

Step 4: Identify the ideal solution matrix of the positive and negative ideal solution. The positive ideal solution is denoted as A^+ whereas the negative ideal solution is A^- .

$$A^+ = \{(max V_{ij} | j \in J)(min V_{ij} | j \in J')\} = \{v_1^+, v_2^+, \dots, v_n^+\} \quad (6)$$

$$A^- = \{(min V_{ij} | j \in J)(max V_{ij} | j \in J')\} = \{v_1^-, v_2^-, \dots, v_n^-\} \quad (7)$$

Step 5: Calculate the separation.

$$d_i^+ = \sqrt{\sum_{j=1}^n (V_{ij} - v_j^+)^2}, i = 1, 2, \dots, m \quad (8)$$

$$d_i^- = \sqrt{\sum_{j=1}^n (V_{ij} - v_j^-)^2}, i = 1, 2, \dots, m \quad (9)$$

Step 6: Calculate the relative proximity to the ideal solution (C_i^*)

$$C_i^* = \frac{d_i^-}{d_i^- + d_i^+} \text{ where } C_i^* \in [0, 1], i = 1, \dots, m \quad (10)$$

Step 7: Sort the decision alternatives.

The corresponding C_i^* value for each decision alternative is sorted in descending order. The decision alternative with the highest C_i^* value is chosen as the best solution.

Results and discussion

Table 2 and Table 3 present the normalized decision matrix and weighted normalized decision matrix of the five companies respectively based on the average value from year 2013 to 2017 in this study. Table 4 displays the positive ideal solution and negative ideal solution for each financial ratio.

Table 2: Normalized decision matrix.

Company Name	CR	ROE	PM	DER	EPS	DY	PE
F&N	0.3669	0.1907	0.0758	0.2299	0.3303	0.2340	0.4659
HUPSENG	0.5230	0.2800	0.0331	0.1628	0.0351	0.8816	0.3806
KAWAN	0.7006	0.1494	0.1754	0.0799	0.0507	0.0796	0.3663
NESTLE	0.1392	0.9182	0.9743	0.9087	0.9399	0.1716	0.6176
QL	0.2858	0.1410	0.1147	0.2976	0.0604	0.3636	0.3499

Table 3: Weighted normalized decision matrix.

Company Name	CR	ROE	PM	DER	EPS	DY	PE
F&N	0.0524	0.0272	0.0108	0.0328	0.0472	0.0334	0.0666
HUPSENG	0.0747	0.0400	0.0047	0.0233	0.0050	0.1259	0.0544
KAWAN	0.1001	0.0213	0.0251	0.0114	0.0072	0.0114	0.0523
NESTLE	0.0199	0.1312	0.1392	0.1298	0.1343	0.0245	0.0882
QL	0.0408	0.0201	0.0164	0.0425	0.0086	0.0519	0.0500

Table 4: Positive and negative ideal solutions.

	CR	ROE	PM	DER	EPS	DY	PE
A ⁺	0.1001	0.1312	0.1392	0.0114	0.1343	0.1259	0.0500
A ⁻	0.0199	0.0201	0.0047	0.1298	0.0050	0.0114	0.0882

Figure 1 and Figure 2 presents the separation distance of each alternative from the positive ideal solution and negative ideal solution respectively. Based on Figure 1, NESTLE (0.1794) gives the shortest distance to the positive ideal solution, followed by HUPSENG (0.2095), F&N (0.2155), QL (0.2305) and lastly KAWAN (0.2331). On the other hand, as shown in Figure 2, NESTLE (0.2175) has the largest distance from the negative ideal solution, followed by HUPSENG (0.1704), KAWAN (0.1489), F&N (0.1152) and finally QL (0.1064). Table 5 presents the relative proximity of each company to the ideal solution as well as the ranking of companies

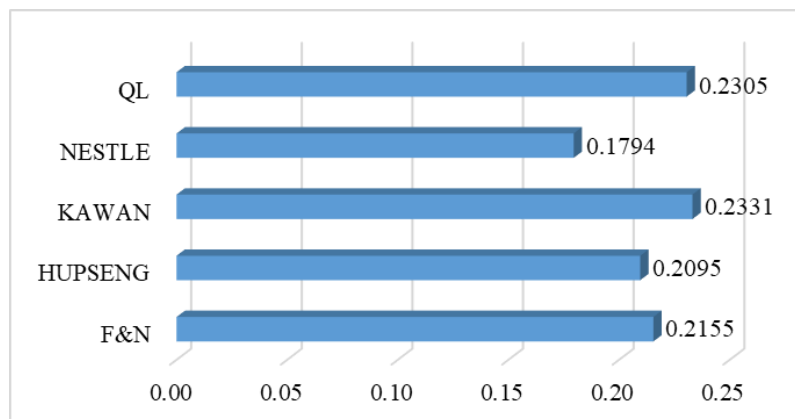


Figure 1 Separation distance of each alternative from the positive ideal solution.

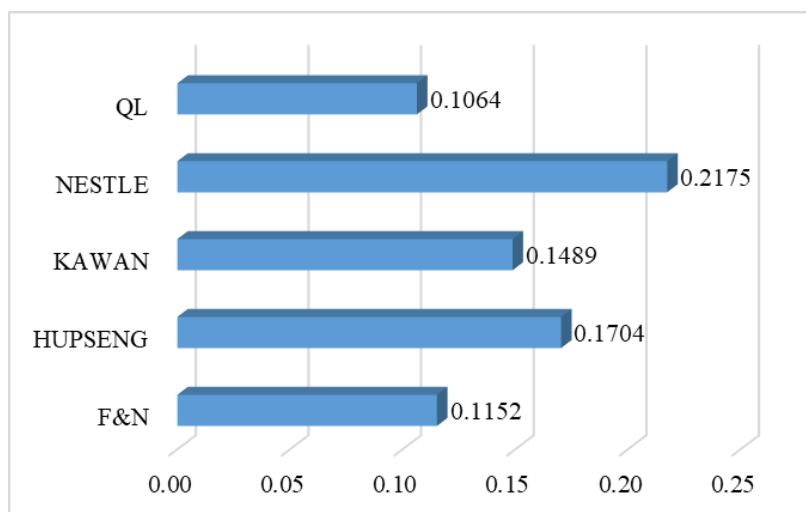


Figure 2 Separation distance of each alternative from the negative ideal solution

Table 5: Relative closeness and ranking of companies.

Company Name	C_i^*	Ranking
F&N	0.3485	4
HUPSENG	0.4485	2
KAWAN	0.3897	3
NESTLE	0.5479	1
QL	0.3158	5

Table 5 shows that the company with the closest proximity to the ideal solution is NESTLE given that it has the largest C_i^* value which is 0.5479. This implies that NESTLE outperforms the rest of the consumer products and services companies examined in this study. In addition, HUPSENG obtained the second ranking according to the results of the analysis with relative closeness of 0.4485. KAWAN and F&N are ranked after HUPSENG with relative closeness of 0.3897 and 0.3485 respectively. QL is found to be the farthest from the positive ideal solution as it has the smallest C_i^* value among the studied companies.

Conclusion

It is of utmost importance to measure the performance of the companies for further improvement. This study aims to propose a conceptual framework to evaluate the financial performance of the consumer products and services companies with TOPSIS model. The main finding of this study shows that NESTLE gives the best performance among the studied companies followed by HUPSENG, KAWAN, F&N and finally QL. This study is significant as the proposed conceptual framework with TOPSIS model allows the evaluation of the performance of the consumer products and services companies in Malaysia.

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