A Study on the Performance of the Retailers in Malaysia with TOPSIS Model

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Citation

Abstract
Retailers play a significant role in contributing and developing the economy of a country. It supplies consumers with a variety of goods through different distributors. In Malaysia, AEON CO. (M) BHD. (AEON), The Store Corporation Berhad (The Store) and Parkson Holding Berhad (Parkson) are the three retailers listed in Bursa Malaysia. The financial performance of the retailers is the main concern in this study. The objective of this study is to propose a conceptual framework in evaluating the financial performance of the retailers with Technique For Order Preference By Similarity To Ideal Solution (TOPSIS) model. Current ratio, return on equity, profit margin, debt to equity ratio, earnings per share, dividend yield and price earning ratio are the financial ratios investigated for the period of 2012-2016 with TOPSIS model. The result of this study shows that Parkson has the top ranking, followed by The Store and AEON. This indicates that Parkson is the closest to the ideal solution and farthest from the negative-ideal solution among the retailers. The robustness of TOPSIS method is it can identify the optimal alternative based on multiple criteria. Decision makers can select the best or optimal solution based on this multiple-criteria decision making problem (MCDM).

1. Introduction
Retailers play a significant role in supplying consumers with goods through various distributions. It can be either a concrete building or through online systems. It contributes to a country’s economy and encourages employment [1]. There are many retailers in Malaysia such as AEON CO. (M) BHD. (AEON), The Store Corporation Berhad (The Store), Parkson Holding Berhad (Parkson), GCH Retail (M) Sdn Bhd (GIANT) and Tesco PLC (TESCO). AEON, The Store and Parkson are the listed companies in Bursa Malaysia.

The earliest established retailer among the three listed retailers is The Store in 1968 [2]. The first outlet was opened at Bukit Mertajam, Penang. Later on, Pacific Hypermarket & Departmental Store was established one year after The Store listed in Bursa Malaysia and Milimewa Superstore joined the group in 2005. Thus, The Store has 75 outlets in total. The second earliest retailer is Parkson in 1982 [3]. Its original name was Amalgamated Cement Mills Sdn Bhd. The name changed to current name after the
company converted to public company in 1992. The company has coverage in four Asia countries, which are Malaysia, Vietnam, Indonesia and Myanmar. Lastly, AEON is named as Jaya Jusco when it was first set up in Malaysia in 1984 [4]. It originates from Japan in order to transfer the expertise and human resource development.

The main concern for organising retailers is to earn profit. Thus, financial performance of the company will influence the assessment towards the company. A strong financial based will be a competitive advantages to develop business. In this study, a conceptual framework is proposed based on Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) model to evaluate the financial performance of three retailers and the ranking for the best retailer can be identified. The financial ratios include current ratio (CR), return on equity (ROE), profit margin (PM), debt to equity ratio (DER), earnings per share (EPS), dividend yield (DY) and price earning ratio (PER).

TOPSIS model is able to deal with multiple criteria and select an optimal decision alternative [5]. The robustness of TOPSIS model is that it can identify the relative closeness or the distance between the ideal solution and negative-ideal solution. An optimal solution is the alternative that has the closest distance to the ideal solution. TOPSIS is a mathematical model which helps to solve multiple-criteria decision making problem (MCDM) [6-10]. MCDM evaluates multiple criteria in decision making process [11-35].

Besides that, TOPSIS model has been applied in other sectors such as supply chain [36], warehouse [37], sport [38], oil and gas [39]. It shows that TOPSIS method is widely used in different sectors for its ability to identify optimal decision alternative. Thus, this study aims to determine the best retailer using TOPSIS method through evaluation of financial ratios. The rest of the paper is organized as follows. The next section discusses about the data and methodology of the study. Section 3 presents the empirical results of this study. Section 4 concludes the paper.

2. Data and Methodology

2.1. Data

The data of this study consists of listed retailers in Malaysia, which are AEON, The Store and Parkson. This study can determine the optimal decision alternatives among the three retailers based on the study period of 2012-2016. The financial ratios are used to evaluate the financial performance as well as identify the best retailers [40-45]. In the proposed conceptual framework with TOPSIS model, the financial ratios are current ratio (CR), return on equity (ROE), profit margin (PM), debt to equity ratio (DER), earning per share (EPS), dividend yield (DY) and price earnings ratio (PER). The annual report are obtained from Bursa Malaysia. As a point of view from the investors, the ideal criteria CR, ROE, PM, EPS and DY are preferred the higher the better while negative-ideal criteria DER and PER should be lower. Table 1 presents the formula for the financial ratios used in this study [8, 45].

<table>
<thead>
<tr>
<th>Financial Ratio</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>CA/TE</td>
</tr>
<tr>
<td>ROE</td>
<td>NP/TE</td>
</tr>
<tr>
<td>PM</td>
<td>CA/CL</td>
</tr>
<tr>
<td>DER</td>
<td>TL/TE</td>
</tr>
<tr>
<td>EPS</td>
<td>NS/DPS</td>
</tr>
<tr>
<td>DY</td>
<td>PPS/PSS</td>
</tr>
<tr>
<td>PER</td>
<td>EPS%</td>
</tr>
</tbody>
</table>

Step 1: Formulate \((m \times n)\) matrix \((x)\)

\[
x = \begin{bmatrix}
    x_{11} & x_{12} & \cdots & \cdots & x_{1n} \\
    \vdots & \vdots & \ddots & \cdots & \vdots \\
    x_{m1} & x_{m2} & \cdots & \cdots & x_{mn}
\end{bmatrix}
\]  

Step 2: Construct Normalized Decision Matrix \((R)\)

Normalization enables the conversion of dimensional

2.2. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)

TOPSIS model is designed for multi-criteria decision making (MCDM) problems by obtaining an optimal solution or best alternative under multiple criteria. Distance of each criterion between the positive and negative ideal solution is the consideration factor in this model. The best alternative has the closest distance to the ideal solution while farthest distance from the negative ideal solution. Hence, TOPSIS model can identify the preference order of decision alternatives through distance comparison.

The steps of TOPSIS model are shown as below:

**Step 1:** Formulate \((m \times n)\) matrix \((x)\)

Given that there are \(m\) decision alternatives and \(n\) criteria for the problem. The matrix formulation will be \((m \times n)\) matrix with \(x_{ij}\) as the elements and \(i = 1,2,3,\ldots,m\) while \(j = 1,2,3,\ldots,n\).

\[
x = \begin{bmatrix}
    x_{11} & x_{12} & \cdots & \cdots & x_{1n} \\
    \vdots & \vdots & \ddots & \cdots & \vdots \\
    x_{m1} & x_{m2} & \cdots & \cdots & x_{mn}
\end{bmatrix}
\]

**Step 2:** Construct Normalized Decision Matrix \((R)\)
criteria into non-dimensional criteria. All entries in matrix \( x \) will be normalized based on the formula below.

\[
ry = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}, \quad i = 1, 2, ..., m; \quad j = 1, 2, ..., n
\]  

(2)

The normalized matrix is represented by \( R \) with \( r_{ij} \) as entries.

\[
R = \begin{bmatrix}
    r_{11} & r_{12} & \cdots & \cdots & r_{1n} \\
    \vdots & \vdots & \ddots & \ddots & \vdots \\
    r_{m1} & r_{m2} & \cdots & \cdots & r_{mn}
\end{bmatrix}
\]  

(3)

**Step 3:** Construct Weighted Normalized Decision Matrix \( (V) \)

The weighted normalized decision matrix is determined as follows.

\[
W = (w_1, w_2, ..., w_n) \text{ where } \sum_{j=1}^{n} w_j = 1.
\]

Taking \( W \) and \( R \) together, \( V \) is generated as below.

\[
V = \begin{bmatrix}
    w_1 r_{11} & w_2 r_{12} & \cdots & \cdots & w_n r_{1n} \\
    \vdots & \vdots & \ddots & \ddots & \vdots \\
    w_1 r_{m1} & w_2 r_{m2} & \cdots & \cdots & w_n r_{mn}
\end{bmatrix}
\]

(4)

where \( v_{ij} = w_n r_{mn} \).

**Step 4:** Determine Ideal Solution and Negative-Ideal Solution

Let \( A^+ \) be ideal decision alternative and \( A^- \) be negative ideal decision alternative.

\[
A^+ = \{\max v_{ij} \mid j \in J^+, \min v_{ij} \mid j \in J^-, i = 1, 2, ..., m\} = \{v_{1+}, v_{2+}, ..., v_{n+}\}
\]

(5)

\[
A^- = \{\min v_{ij} \mid j \in J^+, \max v_{ij} \mid j \in J^-, i = 1, 2, ..., m\} = \{v_{1-}, v_{2-}, ..., v_{n-}\}
\]

(6)

where \( J = \{j = 1, 2, ..., n \} \) and \( J^- = \{j = 1, 2, ..., n \} \) is associated with benefit criteria and loss criteria respectively.

In other words, \( J \) is the set of benefit attributes with the higher the better whereas \( J^- \) is the set of negative attributes with the lower the better.

**Step 5:** Calculate Separation Measure \( (s_i^+ \text{ and } s_i^-) \) from Positive-Ideal Solution and Negative-Ideal Solution

Separation distance measures the distance of each alternative from the positive-ideal solution and negative-ideal solution.

\[
s_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_{ij}^+)^2}, \quad i = 1, 2, ..., m,
\]

(7)

\[
s_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_{ij}^-)^2}, \quad i = 1, 2, ..., m.
\]

(8)

**Step 6:** Calculate Relative Closeness to the Ideal Solution \( (C_i^*) \)

The best decision alternative will has the closest distance to the positive-ideal solution while farthest distance from the negative-ideal solution. Hence, a higher value of \( C_i^* \) is more preferred.

\[
C_i^* = \frac{s_i^-}{s_i^+ + s_i^-}
\]

(9)

where \( 0 \leq C_i^* \leq 1 \) and \( i = 1, 2, ..., m \).

\( C_i^* = 1 \) if and only if the decision alternative is the best alternative and vice versa for \( C_i^* = 0 \).

**Step 7:** Rank the Preference Order

Sort the \( C_i^* \) value in descending order and the best or optimal decision alternative is selected from the highest \( C_i^* \) value where its is closest to 1.

### 3. Result and Discussion

Table 2 until Table 4 indicate the decision matrix, normalized matrix and weighted normalized matrix of the financial performance of three retailers from 2012 until 2016. Table 3 is the normalization of table 2 based on equation (2) whereas Table 4 applies equal weight for each financial ratios.

<table>
<thead>
<tr>
<th>Company</th>
<th>CR</th>
<th>ROE</th>
<th>PM</th>
<th>DER</th>
<th>EPS</th>
<th>DY</th>
<th>PER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeon</td>
<td>0.5497</td>
<td>10.6913</td>
<td>4.9811</td>
<td>1.0229</td>
<td>0.3282</td>
<td>2.9054</td>
<td>21.0153</td>
</tr>
<tr>
<td>The Store</td>
<td>1.1413</td>
<td>2.8586</td>
<td>0.7160</td>
<td>1.2696</td>
<td>0.1894</td>
<td>1.3664</td>
<td>-11.1386</td>
</tr>
<tr>
<td>Parkson</td>
<td>1.5725</td>
<td>14.0892</td>
<td>10.8003</td>
<td>1.7940</td>
<td>0.3508</td>
<td>14.4370</td>
<td>3.6918</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company</th>
<th>CR</th>
<th>ROE</th>
<th>PM</th>
<th>DER</th>
<th>EPS</th>
<th>DY</th>
<th>PER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeon</td>
<td>0.2722</td>
<td>0.5968</td>
<td>0.4181</td>
<td>0.4219</td>
<td>0.6355</td>
<td>0.1964</td>
<td>0.8731</td>
</tr>
<tr>
<td>The Store</td>
<td>0.5652</td>
<td>0.1596</td>
<td>0.0601</td>
<td>0.5237</td>
<td>0.3668</td>
<td>0.0924</td>
<td>-0.4628</td>
</tr>
<tr>
<td>Parkson</td>
<td>0.7787</td>
<td>0.7864</td>
<td>0.9064</td>
<td>0.7400</td>
<td>0.6794</td>
<td>0.9762</td>
<td>0.1534</td>
</tr>
</tbody>
</table>
Next, \(A^+\) and \(A^-\) are determined based on Table 4. For maximization problem, largest value will be selected as the \(A^+\) whereas smallest value will be selected as \(A^-\) under minimization problem. In this study, all criteria are maximization problem except DER and PER. The ideal and negative ideal solutions are shown in Table 5.

Steps 6 and 7 are performed to determine the relative closeness of decision alternative to the ideal solution and the results are shown in Table 7.

As shown in Table 7, Parkson gives the highest \(C_i^+\) value of 0.7056 which indicates that Parkson is the best retailer among the others. The result entails also Parkson has a better overall performance over the five years that enables the company to stand for the first ranking. The second ranking falls on The Store with relative closeness of 0.4920. Lastly, AEON is the farthest from the ideal solution with a lowest relative closeness of 0.2932.

4. Conclusion

TOPSIS model enables decision makers to deal with MCDM problems. In this study, a conceptual framework is proposed based on TOPSIS model to evaluate the financial performance and determine the ranking of three listed retailers in Malaysia. The financial ratios are used to assess the company’s financial performance over five years. The result of this study shows that Parkson achieves the first ranking in the evaluation on financial performance because it gives the highest relative closeness to the ideal solution. The ranking of financial performance is followed by The Store and AEON. In summary, TOPSIS is a robust model because it can consider multiple criteria and identify the optimal solution among all decision alternatives.

References


