

# The strategic selecting criteria and performance by using the multiple criteria method

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## ABSTRACT

As the increasing competitive intensity in the current service market, organizational capabilities have been recognized as the importance of sustaining competitive advantage. The profitable growth for the firms has been fueled a need to systematically assess and renew the organization. The purpose of this study is to analyze the financial performance of the firms to create an effective evaluating structure for the Taiwan's service industry. This study utilized TOPSIS (technique for order preference by similarity to ideal solution) method to evaluate the operating performance of 12 companies. TOPSIS is a multiple criteria decision making method to identify solutions from a finite set of alternatives based upon simultaneous minimization of distance from an ideal point and maximization of distance from a nadir point. By using this approach, this study measures the financial performance of firms through two aspects and ten indicators. The result indicated e-life had outstanding performance among the 12 retailers. The findings of this study provided managers to better understand their market position, competition, and profitability for future strategic planning and operational management.

**Keywords:** Organizational capability, TOPSIS, performance, competitive advantage

## 1. INTRODUCTION

Previous literatures on the operations strategy studies have emphasized on the deployment and use of capacity management and demand management strategies. Specifically, studies have emphasized on the influence decisions on the operational performance and how to measure the performance [4]. As the rapid increases in globalization of business activities, increasing numbers of firms have developed strategies to expand their operations into a fiercely competitive market. However, the importance of identifying and understanding factors likely to produce sustained competitive advantage, growth, and enhanced firm financial performance have become even more important to the managers and shareholders [3]. Specially, in such a highly competitive market, it is of strategic importance for firms to understand their relative level of competitiveness in terms of critical elements affecting their competitive advantage [14]. Competitive advantage is the ability that firms is able to create and implement value-creating strategies over its competitors. It comprises capabilities that enable a firm to differentiate itself

from its competitors and is an outcome of critical management decisions [13]. Thus, a firm's competitive advantage can be sustained when it implements a strategy that is not easily to copy by its competitors. In addition, how to leverage resources in creating sustaining competitive advantage for a firm has become the central focus for marketing scholars that link various types of market-based assets, and capabilities with the ultimate financial performance of a firm [5]. As a result, a wide variety of competitive analysis techniques have been developed for organizations to understand their industries and their competitors. However, the evaluation outcomes help firms to identify its competitive related to its competitors. In this study, TOPSIS was used as the evaluating method to identify the oval performance for the retailer sector. In this study, 12 retailers were chosen with two aspects, capability of management and capability of profit-earning. Thus, this study is intended to investigate the ranking of overall financial performance for 12 retailers in term of their abilities to operate in the current market.

## 2. LITERATURE REVIEW

For the past few years, the growth of the service sector has become the dominant element in many economies. As a result, customer service has become a distinct component of both product and service sectors and with the developments in information technology many business find demanding and knowledgeable customers. Thus, Service quality, customer satisfaction and customer value have become the main concern of both manufacturing and service organizations in the increasingly intensified competition for customers in today's customer-centered era [6]. Firms are seeking for new and better ways to create value and differentiate their market offerings to attract and keep customers and make a profit [1]. Thus, customer-focus is critical to business profitability and a necessary antecedent of competitive advantage for leading the success of business. However, market share can be used to describe the position of an organization within its industrial sector. As organizations with market leader positions tend to derive profitability from their economies of scale capability as well as their established branding [12]. However, capabilities have attracted the interest of researchers. The general term capability is a wider concept than competence including, besides competence, strategy, linking of resources and abilities. Indeed, organizational capability represents the capacity of the organization itself as a source of competitive advantage to

perform better than competitors by using a unique and difficult to replicate set of resources. Thus, the opportunity for firms to sustain the competitive advantage is determined by firms' capabilities. Recently, resource-based view (RBV) has been an emerging viewpoint which emphasized on the resource's implication for the organizational performance and capabilities [10,11]. According to RBV, firms possess resources that are difficult or costly to copy, can provide firms a competitive advantage. RBV of a firm suggest that a firm's resources and capabilities impact the growth and performance of the firm [8,9]. Furthermore, the transaction cost economics (TCE) theoretical approach has been applied successfully in explaining the most efficient criteria, such as cost minimization and value enhancement, which leads to best performance. In general, TCE has provided firms with the most efficient structure, which focuses on cost minimization and identified the organizational capabilities for improving the competence and sustained performance. Thus, performance appraisal and evaluation become necessary for future strategic planning and improvement.

### 3. METHODOLOGY

In this study, TOPSIS (technique for order preference by similarity to ideal solution) method was used for the evaluation of operating performance in the service industry. The service industry was defined as the industry that provided service in term of the wholesale, retail trades, transportation and communication, and hotel service etc. For the purpose of this study, retail trades were selected and data was collected from Market Observation Post System (MOPS), a system that handles the transmission of thousands of financial records for Taiwan Futures Exchange (TAIFEX). From MOPS, 13 retailers were classified as the retail trades sector. Due to the incomplete data, some values may not be obtained for this study; therefore, 12 retailers with complete information were chosen to evaluate the overall financial performance and their ranking for the latest three years. In order to analyze the data for 12 retailers, two aspects, capability of management and capability of profit-earning with ten indicators were obtained from year of 2003 to 2005 as shown in the table 1, table 2, and table 3.

Table 1. Financial report of 2003 for each retailer.

	7-11 (A1)	Family Mart (A2)	Far Eastern (A3)	ELife (A4)	Eastern Shopping (A5)	Mur- curies (A6)	Chung Yo (A7)	Sun Far (A8)	Rt Mall (A9)	Poya (A10)	Tung Lin (A11)	Hola (A12)
(C1) Return On Assets (%)	14.28	8.45	1.30	10.16	6.90	5.09	-0.01	15.37	5.77	10.34	7.20	17.60
(C2) Return Of Equity (%)	28.86	22.52	2.00	21.82	15.11	7.94	-32.57	33.89	10.92	27.91	16.87	33.58
(C3) Operating Income to Capital Stock (%)	36.04	33.82	3.70	34.97	18.98	3.77	0.22	57.61	2.10	37.03	12.57	12.04
(C4) Profit Before Tax to Capital Stock (%)	45.83	38.10	4.00	34.46	16.67	11.72	-10.55	60.93	9.90	51.45	14.98	26.14
(C5) Profit Margin (%)	4.74	2.26	1.70	2.64	8.33	6.03	-6.94	3.42	7.85	3.43	10.57	8.16
(C6) Earnings per Share (NT\$)	4.29	2.99	0.33	2.61	1.71	1.01	-1.13	4.66	1.03	3.94	1.28	3.60
(C7) Inventory Turnover (times)	28.25	21.37	7.80	7.10	42.97	4.69	1.39	12.97	3.35	4.84	46.58	6.36
(C8) Days-Inventory Turn	12.92	17.08	46.79	51.40	8.49	77.82	262.58	28.14	108.95	75.41	7.83	57.38
(C9) Fixed Asset Turnover (times)	11.70	12.56	0.80	50.91	3.85	2.49	0.80	14.15	1.58	10.43	1.19	7.20
(C10) Total Asset Turnover (times)	2.95	3.74	0.50	3.20	0.67	0.75	0.59	4.16	0.53	2.83	0.62	2.15

Table 2. Financial report of 2004 for each retailer.

	7-11 (A1)	Family Mart (A2)	Far Eastern (A3)	ELife (A4)	Eastern Shopping (A5)	Mur- curies (A6)	Chung Yo (A7)	Sun Far (A8)	Rt Mall (A9)	Poya (A10)	Tung Lin (A11)	Hola (A12)
(C1) Return On Assets (%)	10.86	8.74	4.60	10.30	8.71	2.74	4.52	12.75	1.94	9.38	6.19	13.68
(C2) Return Of Equity (%)	21.63	22.97	9.00	23.69	17.37	3.75	14.15	25.56	1.83	27.09	12.68	21.60
(C3) Operating Income to Capital Stock (%)	34.87	39.65	4.60	47.27	27.11	4.92	0.77	43.60	4.31	50.88	16.85	15.82
(C4) Profit Before Tax to Capital Stock (%)	41.37	42.69	15.80	44.88	24.57	5.55	4.09	44.22	2.03	54.40	13.58	21.89
(C5) Profit Margin (%)	3.76	2.39	8.60	2.78	10.41	2.78	2.34	2.99	1.87	3.44	8.53	6.59
(C6) Earnings per Share (NT\$)	3.33	3.32	1.59	3.27	2.36	0.49	0.41	3.38	0.19	4.11	1.21	2.30
(C7) Inventory Turnover (times)	26.48	20.88	9.40	7.67	40.61	5.31	2.40	12.86	3.56	5.30	39.92	6.35
(C8) Days-Inventory Turn	13.78	17.48	38.82	47.58	8.98	68.73	152.08	28.38	102.52	68.86	9.14	57.48
(C9) Fixed Asset Turnover (times)	8.80	11.94	0.80	55.50	6.15	2.69	0.95	13.03	1.30	7.94	1.27	9.61
(C10) Total Asset Turnover (times)	2.77	3.65	0.50	3.60	0.77	0.78	0.73	4.01	0.45	2.57	0.68	2.08

Table 3. Financial report of 2005 for each retailer.

	7-11 (A1)	Family Mart (A2)	Far Eastern (A3)	ELife (A4)	Eastern Shopping (A5)	Mur- curies (A6)	Chung Yo (A7)	Sun Far (A8)	Rt Mall (A9)	Poya (A10)	Tung Lin (A11)	Hola (A12)
(C1) Return On Assets (%)	11.81	7.96	3.00	12.77	8.59	-3.15	3.94	10.16	3.47	10.94	8.11	11.46
(C2) Return Of Equity (%)	24.73	21.57	5.50	26.86	14.73	-6.69	9.29	20.15	5.47	29.00	14.69	20.88
(C3) Operating Income to Capital Stock (%)	45.64	37.92	6.60	49.34	19.33	3.44	7.72	36.57	-0.81	44.27	18.77	33.67
(C4) Profit Before Tax to Capital Stock (%)	50.60	42.75	10.00	52.44	18.95	-6.58	4.24	38.23	4.91	49.44	17.70	45.36
(C5) Profit Margin (%)	3.90	2.30	5.40	3.68	11.01	-5.02	1.78	2.61	6.83	4.91	10.67	4.84
(C6) Earnings per Share (NT\$)	3.99	3.28	0.98	4.70	1.82	-0.84	0.30	2.71	0.57	4.44	1.56	4.01
(C7) Inventory Turnover (times)	26.08	20.16	67.40	8.23	29.53	4.87	3.70	11.76	3.25	4.93	36.41	5.77
(C8) Days-Inventory Turn	13.99	18.10	5.41	44.34	12.36	74.94	98.64	31.03	112.30	74.03	10.02	63.25
(C9) Fixed Asset Turnover (times)	13.47	12.89	0.90	82.82	10.41	2.85	0.92	12.95	1.23	5.99	1.35	9.08
(C10) Total Asset Turnover (times)	2.78	3.46	0.50	2.95	0.74	0.72	0.74	3.68	0.37	2.19	0.74	2.37

**TOPSIS analysis**

Technique for order preference by similarity to ideal solution (TOPSIS) is developed by Hwang and Yoon [2], is a multiple criteria decision making method which viewed a multi-attribute

decision-making problem with m alternatives as a geometric formula with m points in the k-dimensional space [14]. However, TOPSIS ranking analysis is applied to evaluate indicators proposed in the study and it can be calculated by

follows steps:

(1) Construct the original data to evaluate matrix

Assuming to use  $k$  criteria ( $C_1, C_2, \dots, C_k$ ) to evaluate  $m$  subjects ( $A_1, A_2, \dots, A_m$ ), the ordinary original data evaluate matrix represents as follows:

$$X = \begin{matrix} & C_1 & C_2 & \dots & C_k \\ A_1 & \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1k} \end{bmatrix} \\ A_2 & \begin{bmatrix} x_{21} & x_{22} & \dots & x_{2k} \end{bmatrix} \\ \dots & \begin{bmatrix} \dots & \dots & \dots & \dots \end{bmatrix} \\ A_m & \begin{bmatrix} x_{m1} & x_{m2} & \dots & x_{mk} \end{bmatrix} \end{matrix} \quad (1)$$

The formula for translation if there are minuses in the original data

$$f_j(x) = \frac{A_j - B_j}{\text{sign}(A_j) \times \text{ABS}(A_j) - \text{sign}(B_j) \times \text{ABS}(B_j)} * [x - \text{INT}(B_j)] \quad j = 1, 2, \dots, k \quad (2)$$

Among this formula,

$$A_j = \text{Maximize}(x_{1j}, x_{2j}, \dots, x_{mj}) \quad j = 1, 2, \dots, k$$

$$B_j = \text{Minimize}(x_{1j}, x_{2j}, \dots, x_{mj}) \quad j = 1, 2, \dots, k$$

(2) Normalize the original data to evaluate matrix

The purpose of normalize the original data is to look for the consistence and comparability between each unit.

The evaluation criteria ( $C_1, C_2, \dots, C_k$ ) may use different unit, so that the normalization of evaluation matrix must done.

$$x_{ij} = \frac{x_{ij}}{\sum_{p=1}^m x_{pj}} \quad i = 1, 2, \dots, m \quad (3)$$

After normalize the (1) original data evaluation matrix, the outcome matrix can be represent as follow:

$$R = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1k} \\ r_{21} & r_{22} & \dots & r_{2k} \\ \dots & \dots & \dots & \dots \\ r_{m1} & r_{m2} & \dots & r_{mk} \end{bmatrix} \quad (4)$$

(3) Calculate the weight of each evaluation criterion

The entropy method is sampled; there are 2 steps to compute the weight of each evaluation criterion:

Step one. Compute the entropy value of each evaluation criterion ( $C_1, C_2, \dots, C_k$ )

By quoting the entropy concept to compute the weight of each criterion,  $e_j$  represents the Entropy value of  $j$  subject.

$$e_j = -\frac{1}{\ln m} \sum_{i=1}^m r_{ij} \ln r_{ij} \quad j = 1, 2, \dots, k \quad (5)$$

Meanwhile the  $\frac{1}{\ln m}$  is a constant, to make sure that

the  $e_j$  value is between 0 to 1.

Step two. Compute the weights  $w_1, w_2, \dots, w_k$  of each evaluation criterion.

$$w_j = \frac{1 - e_j}{\sum_{i=1}^k (1 - e_i)} \quad j = 1, 2, \dots, k \quad (6)$$

(4) Determine the ideal solution  $V^+$  and negative ideal solution  $V^-$  of each evaluation criterion

Let's calculate the ideal solution  $V^+$  and negative ideal solution  $V^-$  of each criterion in order to obtain the performance index of each evaluation subject.

$$V^+ = (\max_i(r_{i1}), \max_i(r_{i2}), \dots, \max_i(r_{ik})) = (v_1^+, v_2^+, \dots, v_k^+) \quad (7)$$

$$V^- = (\min_i(r_{i1}), \min_i(r_{i2}), \dots, \min_i(r_{ik})) = (v_1^-, v_2^-, \dots, v_k^-)$$

(5) Compute the distance of each evaluation subject and their ideal solution  $V^+$  and negative ideal solution  $V^-$ .

Based on the formula (8), compute the distance between

$$A_i \text{ to } V_i^+, \text{ and also } A_i \text{ to } V_i^-. \quad d_i^+ = \left[ \sum_{j=1}^k w_j (v_j^+ - r_{ij})^2 \right]^{1/2} \quad i = 1, 2, \dots, m \quad (8)$$

$$d_i^- = \left[ \sum_{j=1}^k w_j (r_{ij} - v_j^-)^2 \right]^{1/2} \quad i = 1, 2, \dots, m$$

$d_i^+$  Represents the distance from the  $i$  evaluation subject to ideal solution,  $d_i^-$  represents the distance between the  $i$  evaluation subject to negative ideal solution.

(6) Compute the relative performance index value of the ideal solution.

For each evaluation subject, the computations of relative performance index as follows:

$$P_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad i = 1, 2, \dots, m \quad (9)$$

(7) Sorting the evaluation subjects by the relative performance index value.

While the distance  $d_i^-$  from the  $i$  evaluation subject to negative ideal solution, the  $P_i$  value got bigger represents that it's close with Ideal Solution and far away from negative ideal solution. It means better while  $P_i$  value is bigger.

#### Illustration of TOPSIS analysis

By calculating the above formula, this study first constructed the original data to evaluate matrix, see table 1, 2 and 3. If there are minuses in the original data, then translate the data by using the formula (2). Next, normalize the original data to evaluate matrix by formula (3). Then, calculate the weight of each evaluation criterion by formula (5) and (6), see table 4, 5 and 6.

Table 4. The weight of each evaluation criterion in 2003.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	
<b>ej</b>	0.9339	0.9593	0.8442	0.9254	0.9556	0.9629	0.8045	0.7652	0.7393	0.8911	total
<b>1- ej</b>	0.0661	0.0407	0.1558	0.0746	0.0444	0.0371	0.1955	0.2348	0.2607	0.1089	1.2187
<b>wj</b>	0.0543	0.0334	0.1279	0.0613	0.0364	0.0305	0.1604	0.1926	0.2139	0.0893	

Table 5. The weight of each evaluation criterion in 2004.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	
<b>ej</b>	0.9515	0.9411	0.8728	0.8949	0.9320	0.9126	0.8593	0.8785	0.7273	0.8968	total
<b>1- ej</b>	0.0485	0.0589	0.1272	0.1051	0.0680	0.0874	0.1407	0.1215	0.2727	0.1032	1.1334
<b>wj</b>	0.0428	0.0519	0.1122	0.0927	0.0600	0.0771	0.1242	0.1072	0.2406	0.0911	

Table 6. The weight of each evaluation criterion in 2005.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	
<b>ej</b>	0.9586	0.9456	0.8918	0.9130	0.9627	0.9323	0.7494	0.8379	0.6635	0.9027	total
<b>1- ej</b>	0.0414	0.0544	0.1082	0.0870	0.0373	0.0677	0.2506	0.1621	0.3365	0.0973	1.2426
<b>wj</b>	0.0333	0.0438	0.0871	0.0700	0.0300	0.0545	0.2016	0.1305	0.2708	0.0783	

In addition, determine the ideal solution  $V^+$  and negative ideal solution  $V^-$  of each evaluation criterion by formula (7), see table 7, 8 and 9.

Table 7. Ideal and negative-ideal solutions in 2003.

<b>Vj+</b>	0.1625	0.1144	0.2278	0.1651	0.1290	0.1324	0.2595	0.3810	0.4327	0.1833
<b>Vj-</b>	0.0087	0.0007	0.0009	0.0010	0.0004	0.0173	0.0022	0.0012	0.0068	0.0220

Table 8. Ideal and negative-ideal solutions in 2004.

<b>Vj+</b>	0.1449	0.1346	0.1751	0.1727	0.1843	0.1583	0.2247	0.2478	0.4626	0.1775
<b>Vj-</b>	0.0205	0.0091	0.0026	0.0064	0.0331	0.0073	0.0133	0.0146	0.0067	0.0199

Table 9. Ideal and negative-ideal solutions in 2005.

<b>Vj+</b>	0.1224	0.1332	0.1601	0.1443	0.1362	0.1439	0.3461	0.2153	0.5348	0.1733
<b>Vj-</b>	0.0062	0.0011	0.0006	0.0010	0.0078	0.0040	0.0013	0.0008	0.0058	0.0174

Furthermore, compute the distance of each evaluation subject and their ideal solution  $V^+$  and negative ideal solution  $V^-$  by formula (8). Then compute the relative performance index value of the ideal solution by formula (9), finally sort the evaluation subjects by the relative performance index value as table 10.

Table 10. Rank the preference order 2003 to 2005.

2003		2004		2005	
Pi	Ranking	Pi	Ranking	Pi	Ranking

7-11	0.3219	4	0.3141	5	0.2851	3
Family Mart	0.3020	6	0.3406	3	0.2567	4
Far Eastern	0.1129	12	0.1427	11	0.3473	2
eLife	0.5551	1	0.7235	1	0.6562	1
Eastern Shopping	0.2869	8	0.3065	6	0.2326	7
Murcuries	0.1732	11	0.1202	12	0.1377	12
Chung Yo	0.3999	2	0.2324	9	0.1805	11
Sun Far	0.3619	3	0.3563	2	0.2399	5

Rt Mall	0.2198	10	0.1620	10	0.1998	10
Poya	0.3035	5	0.3335	4	0.2367	6
Tung Lin	0.2900	7	0.2524	7	0.2324	8
Hola	0.2294	9	0.2524	7	0.2255	9

#### 4. RESULTS

The results of the TOPSIS analysis indicated that e-life had the best financial performance than other retailers. Especially, it maintained its position as a leader for three continuous years (see table 10). For the past years, e-life focused on improving customer and employee satisfaction as its strategies to sustain competitive advantages. As the result, the finding suggested that increasing customer satisfaction and organizational efficiencies has become an organization ability to identify sources of sustainable competitive advantage. Thus, it is very important to understand customer needs in which help to develop customer loyalty, market share, and competitive advantages. In addition, the result showed that Far Eastern (shopping) department store was in the second position. Compared to the past two years, Far Eastern (shopping) department store was appeared to have an outstanding performance. From the result of overall financial performance, e-life and Far Eastern (shopping) department store indicated that performance advantage through improved organizational capabilities and adjusted their competitive strategies will able to lead a better performance and willable to sustain competitive advantages.

#### 5. CONCLUSIONS

In today competitive market, strategic planning is necessary in industries in which will strengthen firms' competitive position and help to sustain competitive advantages. Thus, analyzing competitive position and leverage resources is a key determinant of a firm's profitability. However, to sustain profitable growth and maintain a competitive advantage, firms will need to embrace consolidation and seek opportunities in new market. Furthermore, maximizing customer satisfaction will maximize profitability and market share, while customer satisfaction is necessary to any successful business. Recently, TOPSIS method has been used widely in evaluating the financial performance. The TOPSIS method could help the decision makers to determine the strategy for providing an alternative for making critical decisions. This study utilized TOPSIS method to evaluate the ranking of the financial performance for the service sector. From the results of this study, the finding indicated that the ranking of overall performance of 12 retailers by using the TOPSIS method for three years as shown in table 6, e-life had better performance among 12 retailers for the past three years and followed by Far Eastern (shopping) department store. The findings of this study imply that firms would need to understand their competitive position and adopt a differentiation strategy, which are better able to sustain superior performance. However, the future study may focus on identifying an appropriate selecting strategy to enable firms to serve their customers and to differentiate themselves to gain the better position in today's turbulent world. In conclusion, firms need to develop and create new resources and capabilities for sustaining competitive advantage in response to rapidly changing market environment.

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