A Study of Marketing Performance Evaluation System for Notebook Distributors

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Abstract

The hi-tech industry plays an important role in the industry structure of Taiwan as evidenced by the development of the information industry, with the notebook industry in the lead. The aim of this study is to develop a marketing performance evaluation model for Taiwanese notebook distributors. A total of 19 marketing performance evaluation indicators, including financial-perspective factors, customer-perspective factors, internal process factors, and innovation and learning factors are established based on a review of the relevant literature. Each indicator is arranged into four criteria according to the balanced scorecard method. The analytic hierarchy process (AHP) is used to decide the priority and relative weights of the criteria. The management of notebook distributorships can use this marketing performance evaluation model to objectively assess their performance.

Keywords: marketing performance evaluation, the balanced scorecard, AHP

1. Introduction

The hi-tech industry plays an important role in Taiwan's industry structure as evidenced, in particular, by the development of the information industry, with the notebook industry taking the lead. According to the report of Market Intelligence & Consulting Institute (MIC), the output of the notebook industry in Taiwan accounted for more than 85% of the total world output in 2006. The quarterly survey of International Data Corporation (IDC) suggests that the output of Taiwan's notebook industry in the fourth quarter of 2007 grew by 44% compared to the same period of the previous year, setting a record high. As indicated, Taiwan has become the leading producer of notebook computers.

The purpose of this study is to develop a marketing performance evaluation model for Taiwanese notebook distributors. The importance of marketing performance evaluation has been emphasized in numerous marketing studies (Clark, Abela & Ambler, 2006; Grønholdt & Martensen, 2006; O'Sullivan & Abela, 2007). A number of studies have focused on the relationship among marketing performance, other performance indicators and corporate performance (Furrer, Alexandre & Sudharshan, 2007; Homburg, Artz & Wieseke, 2012; Schramm-Klein & Morschett, 2006). There are multiple indicators of marketing performance (Barwise & Farley, 2004), but the importance priority of each indicator, from the viewpoint of marketing managers, remains unknown.

The purpose of every performance evaluation system is to encourage staff to effectively match the corporate goals (Meyer, 1994). Therefore, a performance evaluation system should incorporate financial and non-financial indicators that are closely aligned with future corporate strategies and goals. This study adopts the balanced scorecard method to measure marketing performance. The balanced scorecard is a crucial marketing performance measurement approach (Biggart, Burney, Flanagan & Harden, 2010; Wu & Hung, 2007). In addition to traditional financial performance indicators, non-financial performance indicators, which are connected to future competition advantages, are also considered in the balanced scorecard (Banker, Chang & Pizzini, 2011; Kaplan & Norton, 1992). However, it is difficult to decide the relative importance and weights of

the balanced scorecard indicators (Kaplan & Norton, 1996; Youngblood & Collins, 2003).

Objectively identifying the priority weight of each performance-evaluating indicator can help management to correctly measure marketing performance, thus avoiding waste and inefficiency. The Analytic Hierarchy Process (AHP), developed by Saaty, is a kind of multi-criteria decision making (MCDM) technique that is in widespread use for computing relative weights. The AHP method enables decision makers to represent the simultaneous interaction of many factors in complex and unstructured situations.

A systematic marketing evaluation model incorporated with the balanced scorecard and the AHP method is proposed in this study. Evaluation criteria are proposed according to the balanced scorecard, and the AHP method is used to decide the priority and weight of those criteria. The provided model could help notebook distributors to measure and enhance their marketing performance.

2. Literature Review

2.1 Marketing Performance

The criteria of marketing performance may vary in accordance with different people and different objectives. In the past, scholars believed that marketing performance can be measured by growth and profitability (Covin & Slevin, 1991). Grønholdt and Martensen (2006) argue that marketing performance can be measured by financial outcomes, the outcome of customer feelings, marketing outcomes and the outcome of customer behavior. Lumpkin and Dess (1996) propose that in addition to conventional accounting factors such as the sales growth rate, market share and profitability, the satisfaction of stakeholders should be considered in measuring marketing performance. Barwise and Farley (2004) indicate that market share and the perception of product/service quality are the most used performance indicators in the US, Japan, Germany, England and France.

In addition to conventional financial perspectives, market share and customer satisfaction, Munoz and Kumar (2004) also discuss the influence of brand impact on marketing performance, to understand how businesses handle product brands. Ambler and Puntoni (2003) adopt brand popularity to directly measure marketing performance. Other criteria, such as the launch time of new products, the quality of new products, employee training, on-time delivery, the response time for customer complaints and inventory turnover have also been used to measure marketing performance (Maltz, Shenhar & Reilly, 2003; Olson & Slater, 2002; Slater, Olson & Reddy, 1997; Youngblood & Collins, 2003). The literature review reveals that the marketing performance evaluation indicators are similar and are even overlapped. This study summarizes the marketing performance evaluation indicators into four criteria with 19 indicators, as shown in Table 1. The operational definitions of each criteria and the indicators are shown in Table 2 and Table 3.

Table 1. Marketing performance evaluation criteria

Criteria	Indicators
Financial perspective	Sales, Revenue growth, Cash flow, Return on investment
Customer perspective	Customer satisfaction, Customer retention, Market share, Brand popularity, Brand image, Service quality, Goodwill
Internal processes	Response time for customer complaints, On-time delivery, Inventory turnover, Launch time and quality of new products or services
Innovation and learning	Employee satisfaction, Employee training hours, Employee development and advancement opportunities, Turnover rate

Table 2. The operational definitions of notebook distributors' marketing performance evaluation criteria

Goal	Criteria	Operational definitions
The relative weight of marketing performance on the balanced scorecard	Financial perspective	Distributor's revenue performance.
	Customer perspective	Distributor's performance in customer satisfaction, market share, brand image and goodwill.
	Internal processes	Distributor's performance in the handling of customer complaints, delivery time, inventory and new products or services.
	Innovation and learning	Distributor's performance in employee training, development and turnover rate.

Table 3. The operational definitions of notebook distributors' marketing performance evaluation indicators

Criteria	Indicators	Operational definitions
Financial perspective	Sales	Sales volume of the company's products.
	Revenue growth	The company's revenue growth rate.
	Cash flow	The company's cash flow.
	Return on investment	The company product's return on investment.
Customer perspective	Customer satisfaction	Customer satisfaction toward the company.
	Customer retention	The company's customer retention.
	Market share	The company's market share.
	Brand popularity	Customer perception of the company's brand.
	Brand image	Customer perception of the company's brand image.
	Service quality	Customer perception of the company's service quality.
	Goodwill	The level of company goodwill.
Internal processes	Response time for customer complaints	The response time of the company in dealing with customer complaints.
	On-time delivery	The level of on-time delivery to customers of the company.
	Inventory turnover	The company's product inventory ratio and product flow.
	Launch time and quality of new products or services	The launch time and quality of new products and services of the company.
Innovation and learning	Employee satisfaction	Employee satisfaction with the company.
	Employee training hours	The employees' training hours.
	Employee development and advancement opportunities	The level of development and advancement opportunities given by the company to the employees.
	Turnover rate	The employees' turnover rate and level of employees leaving the company.

2.2 The Balanced Scorecard

Based on the balanced scoreboard, this study integrates the different types of marketing performance indicators into a systematic performance evaluation model. The balanced scorecard is an emerging management methodology. It provides a systematic performance measurement and helps corporations to execute management strategies. Due to its generality, it has been widely used in various types of industries, including manufacturing (Gumbus & Lyons, 2002), the service industry (Denton & White, 2000; Papalexandris, Ioannou & Prastacos, 2004; Voelker, Rakich & French, 2001), governmental organizations (Kaplan & Norton, 1996; Lawrie, Cobbold & Marshall, 2004) and non-profitable organizations (Yang, Cheng & Yang, 2005). Kaplan and Norton (2001) argue that excessive dependence on financial indicators will lead enterprises in the wrong development direction. Financial measures only show the past outcome of business activities. They actually are lag indicators. Overly focusing on the financial measures of performance will lead corporations to ignore the creation of long-term value. Hence, in addition to the evaluation of financial lag indictors, the balanced scoreboard also incorporates lead indicators such as customer satisfaction, innovative high-efficiency processes, employee professional expertise, and morale, to help enterprises identify the major performance drivers that can create the overall business performance in the future.

In fact, the balanced scoreboard not only uses traditional financial perspective indicators to measure performance, but also includes customers, internal processes, learning and growth perspectives to measure the operational performance of enterprises and evaluate business performance from both financial and non-financial perspectives (Kaplan & Norton, 1992). In recent years, many studies have explored the symbolic indicators contained in the four perspectives of the balanced scoreboard (Maltz et al., 2003; Olson & Slater, 2002; Slater et al., 1997; Tuan & Venkatesh, 2010; Youngblood & Collins, 2003). Some studies have even proposed adding new perspectives to the balanced scoreboard to reflect the different characteristics of enterprises (Potthoff, Olson,

Thompson & Kissner, 1999; Zelman, Pink & Matthias, 2003).

However, although the balanced scoreboard has integrated the lead and lag indicators as a comprehensive performance evaluation model, there are still a number of difficulties to overcome. Kaplan and Norton (1996) argue that the evaluation indicators of the balanced scoreboard may lead to the problem of appropriate weights. Searcy (2004) and Liedtka (2005) propose that the hierarchical analysis method can provide relative weight information of the performance evaluation indicators of the balanced scoreboard. Youngblood and Collins (2003) suggest that various indicators of the balanced scoreboard should be recognized and selected for appropriate weights.

3. Research Methodology

The purpose of AHP is to decompose a complex situation into the relevant main criteria and sub-criteria, and then use these criteria to establish a hierarchy structure. It helps decision makers to identify and set priorities on the basis of their objectives, knowledge and experience of each problem and it provides a structured approach to solve complex decision-making problems. Meanwhile, AHP reduces the risk of making a mistake. The six steps of the AHP analysis method are described as follows.

3.1 Problem Formulation

The system in which the problem exists should be expanded if possible. However, this may affect the major causes of the problem, which should all be included in the problem. Meanwhile, the scope of the problem should be defined by establishing the planning groups.

3.2 Hierarchy Structure Development

By planning the members of the group, the criteria and sub-criteria affecting the problematic behavior can be found, and brainstorming is used to find alternative plans and their nature. This preliminary structure is then submitted to the decision makers or the decision-making group to determine whether any factors should be added or deleted. Afterwards, either by the planning group or the members of the decision making group, the binary relations between factors can be determined. If relations are determined by the planning group, they are subject to the confirmation of the decision makers or the decision making group. Finally, hierarchical analysis methods such as ISM (interpretive structural modeling) or HAS (hierarchical structural analysis) can be used to establish the hierarchical structure of the problem as a whole.

3.3 Questionnaire Design and Survey

Based on the hierarchy structure, an AHP questionnaire is developed for the decision makers or individuals of the decision group to make a pair-wise comparison, in order to determine the relative priorities of each criterion. The pair-wise comparisons are based on the scale of relative importance, which assumes values between that are between one and nine.

3.4 Calculating the Weights for Each Hierarchy Element and the Consistency Test

The weight computation of the various hierarchies' elements is shown as follows:

1) Establish the pair-wise comparison matrix *A*

The elements of a certain hierarchy are compared in pairs on the basis of a factor of the upper layer. If there are n elements, n(n-1)/2 elements pair-wise comparisons must be carried out. The relative importance of any two elements is rated using a scale that has the values 1, 3, 5, 7, and 9, where 1 denotes "equally important", 3 denotes "slightly more important", 5 denotes "strongly more important", 7 denotes "demonstrably more important" and 9 denotes "absolutely more important". The measurement of the comparative results of *n* elements is placed in the upper triangular part of the pair-wise comparison matrix *A* (the major diagonal line is the comparison of the elements, and hence is 1), and the values of the lower triangle are the reciprocal of the values at the relative position in the upper triangle, namely, $a_{ji}=1/a_{ij}$. This yields an n-by-n matrix *A,* as seen below:

$$A = \begin{vmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ \vdots & \vdots & & \vdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{vmatrix} = \begin{vmatrix} W_1/W_1 & W_1/W_2 & \cdots & W_1/W_n \\ W_2/W_1 & W_2/W_2 & \cdots & W_2/W_n \\ \vdots & \vdots & & \vdots \\ W_n/W_1 & W_n/W_2 & \cdots & W_n/W_n \end{vmatrix} \quad (1)$$

2) Calculate the eigenvector and eigenvalue

Based on the pair-wise comparison matrix *A*, the priority weights of each hierarchy element can be calculated by the eigenvector and the eigenvalue. The eigenvector can be accurately obtained by package software. However,

the solutions may be obtained by normalization if absolute accuracy is not required. Using the following four methods, the pair-wise comparison matrix can be used to obtain the approximate eigenvector:

a) Add up the column elements of the pair-wise comparison matrix. The result of the division of the sum by the total value is the priority of the elements of the column (namely, the eigenvector). The mathematical equation is as shown below:

$$W_i = \frac{\sum\limits_{j=1}^{n} a_{ij}}{\sum\limits_{i=1}^{n} \sum\limits_{j=1}^{n} a_{ij}} \quad i, j = 1, 2, 3, \ldots, n \tag{2}$$

b) Add up the elements of the rows of the pair-wise comparison matrix, and then obtain the reciprocal of the addition results for normalization (namely, the division by adding the reciprocal). The results of the various rows represent the priority rates of the elements (namely, the eigenvector). Its mathematical equation is as shown below:

$$W_j = \frac{1/\sum\limits_{i=1}^{n} a_{ij}}{\sum\limits_{i=1}^{n} (1/\sum\limits_{j=1}^{n} a_{ij})} \quad i, j = 1, 2, 3, \ldots, n \tag{3}$$

c) Conduct normalization of the various rows of the comparison matrix (namely, the elements of the row are divided by the individual elements of the row divide). After this process, add up the elements of the various rows and divide this by the number of elements of the various rows (namely, n), and the result is the priority rate of the elements represented by various columns (namely, the eigenvector). The mathematical equation is as follows:

$$a_{ij} = \frac{a_{ij}}{\sum\limits_{i=1}^{n} a_{ij}} \quad i, j = 1, 2, 3, \ldots, n \tag{4}$$

$$W_{ij} = \frac{\sum\limits_{i=1}^{n} a_{ij}}{n} \quad i, j = 1, 2, 3, \ldots, n \tag{5}$$

d) Multiply the elements of various columns of the pair-wise comparison matrix for extraction of the n root (n is the number of elements of various columns) and conduct normalization of the extraction of the root. The result for each column is the priority rate of the elements (namely, the eigenvector). The mathematical equation is as shown below:

$$W_i = \frac{(\prod\limits_{i=1}^{n} a_{ij})^{1/n}}{\sum\limits_{i=1}^{n} (\prod\limits_{j=1}^{n} a_{ij})^{1/n}} \quad i, j = 1, 2, 3, \ldots, n \tag{6}$$

The eigenvalue can be accurately calculated by package software. The following method is used to obtain the maximum eigenvalue of the pair-wise comparison matrix, if there is no need for absolute accuracy:

$$\lambda_{max} = \frac{1}{n} \left[\frac{W_1'}{W_1} + \frac{W_2'}{W_2} + \cdots + \frac{W_n'}{W_n} \right] \tag{7}$$

Multiply the obtained eigenvector W with the pair-wise comparison matrix to get vector W', and then divide each element of W' by each element of the original eigenvector W. Finally, add up the results and divide the results by the number of elements to get the maximum eigenvalue λmax. The mathematical equation is as shown below:

$$\begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{bmatrix} \begin{bmatrix} W_1 \\ W_2 \\ \vdots \\ W_n \end{bmatrix} = \begin{bmatrix} W_1' \\ W_2' \\ \vdots \\ W_n' \end{bmatrix} \tag{8}$$

3) Consistency test

If the pair-wise comparison matrix A is a positive reciprocal matrix, it will be considerably difficult for decision makers to achieve consistency in a pairwise comparison. Hence, a consistency test is required to test the rationality of judgment during the assessment process. Saaty (1980) proposed using the C.I. (consistency index) and the C.R. (consistency ratio) to test the consistency of weight W_i. In general, if C.I. ≤ 0.1 and C.R. ≤ 0.1, then satisfactory consistency can be achieved. The calculation of C.I. is performed as shown below:

$$C.I. = \frac{\lambda_{max} - n}{n - 1} \tag{9}$$

In a known number of hierarchies and a nominal scale of a positive reciprocal matrix, the randomly produced R.I. is known as the random index. The R.I. and the order of the matrix are related, and C.R. = C.I./R.I.

3.5 Overall Hierarchy Consistency Test

Even if the consistency of each pair-wise comparison matrix is satisfactory, the levels will be different in importance; therefore, the consistency of the entire hierarchical structure should be tested. If the consistency of the entire hierarchical structure is not consistent with requirements, the factorial correlation of the levels will be problematic and an analysis of the elements and correlations should be conducted once again. The entire hierarchical structure's C.I. is as shown below:

$$C.I.H = \sum_{j=1}^{n} \sum_{i=1}^{n} W_{ij} U_{i,j+1}$$

(10)

where W_{ij} is the total weight of the i-th of Layer j, and $U_{i,j}=1$ is the C. I. of all elements of Layer $j+1$ against the i-th of Layer j. N_j denotes the number of elements of Layer j, and various elements of Layer $j+1$ are compared in pairs based on this element. After obtaining the value of C.I.H., it is used to obtain the value of C.R.H. (C.R.H. = C.I.H/R.I.) to determine whether it is acceptable.

3.6 Selection of Alternatives

After calculating the weights of the elements of various layers, the overall hierarchical weights are calculated. Finally, according to the weights of various alternative plans, the optimal alternative plan is determined for the ultimate goals. In the case of one decision maker, the comprehensive score (priority level) of the alternative plan needs to be calculated; in case of a decision group, the comprehensive score of the alternative plan from each decision maker must be calculated before using a weighted average method (such as the geometric mean method) to obtain the weighted comprehensive score and determine the priority of the alternative plans.

4. Research Results

This study conducted a questionnaire survey on the marketing directors of notebook computer distributors, to assess the relative weights of various perspectives and the criteria of the AHP hierarchical structure. A total of 15 copies of the questionnaire were distributed and 12 valid returns were collected (C.R. > 0.1). This study used Expert Choice 2000 software for the AHP questionnaire analysis, and the results are as shown below.

4.1 The Priority Weights of the Four Criteria

The order of the four criteria in terms of the priority weights is: customer perspective (0.512), financial perspective (0.228), innovation and learning (0.148), and internal processes (0.112). The analysis results of the various perspectives are consistent with the consistency test. The results show that the importance of the customer perspective is more significant than that of the other three criteria.

4.2 The Priority Weights of the Financial Perspective Indicators

The order of each indicator of the financial perspective criteria, based on the priority weights, are sales (0.279), return on investment (0.255), cash flow (0.253), and revenue growth (0.212). The analysis results of various perspectives are consistent with the consistency test. As shown by the results, the relative importance between various criteria had no major differences.

4.3 The Priority Weights of the Customer Perspective Indicators

The analysis results of the customer perspective indicators are consistent with the consistency test. The priority of the weights of various criteria is: customer satisfaction (0.245), service quality (0.170), goodwill (0.141), brand popularity (0.135), market share (0.119), brand image (0.105), and customer retention (0.085). As shown by the results, customer satisfaction, service quality and goodwill are three relatively important criteria.

4.4 The Priority Weights of the Internal Process Indicators

The relative priority of the weights of the criteria indicators of internal processes are: on-time delivery (0.402), response time for customer complaints (0.296), inventory turnover (0.189) and launch time and quality of new products or services (0.113). The analysis results on this perspective are consistent with the consistency test. The results suggest that on-time delivery is more important than the other three criteria.

4.5 The Priority Weights of the Innovation and Learning Indicators

The analysis results on the perspective of innovation and learning are consistent with the consistency test. The priority of the weights of various criteria is employee development and advancement opportunities (0.412), turnover rate (0.222), employee satisfaction (0.204) and employee training hours (0.162). As shown by the results, employee development and advancement opportunities are the most important criteria of this perspective.

4.6 The Priority Weights of the Overall Indicators

The overall consistency of various criteria passed the consistency test, suggesting that the weight assessment results could be accepted. The indicators were sorted based on the priority weights for each criteria and are summarized as shown in Table 4. The top five overall criteria are customer satisfaction (0.145), service quality (0.100), goodwill (0.083), brand popularity (0.079) and market share (0.070).

Table 4. Priority weights of the marketing performance balanced scorecard criteria and indicators

Criteria	Weights	Indicators	Weights	Priority
Financial perspective	0.228	Sales	0.064	6
		Revenue growth	0.049	11
		Cash flow	0.058	9
		Return on investment	0.059	8
Customer perspective	0.512	Customer satisfaction	0.145	1
		Customer retention	0.050	10
		Market share	0.070	5
		Brand popularity	0.079	4
		Brand image	0.062	7
		Service quality	0.100	2
		Goodwill	0.083	3
Internal processes	0.112	Response time for customer complaints	0.023	14
		On-time delivery	0.032	13
		Inventory turnover	0.015	18
		Launch time and quality of new products or services	0.009	19
Innovation and learning	0.148	Employee satisfaction	0.021	16
		Employee training hours	0.016	17
		Employee development and advancement opportunities	0.042	12
		Turnover rate	0.022	15

5. Conclusions and Suggestions

Based on the balanced scoreboard, this study integrates various marketing performance indicators into a systematic performance evaluation model, and uses the hierarchical analysis method to set the weights of various criteria. The analysis results suggest that the customer perspective was the most important perspective, followed by the financial perspective and the perspective of innovation and learning, with the internal process perspective being the least important. Further analysis finds that the major criteria of marketing performance include customer satisfaction, service quality and goodwill. The research findings could provide an objective and effective marketing performance evaluation method for notebook computer distributors.

Future studies can further establish a "notebook computer distributors marketing performance assessment table" according to the criteria weight analysis results obtained from this study. Such an assessment table could be used to evaluate the marketing performance of notebook computer distributors in empirical analysis.

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