

A MODEL FOR EVALUATING THE EFFECTIVENESS OF A COMMERCIAL WEB SITE USING THE BALANCED SCORECARD

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Abstract

The effectiveness of a company web site is defined as the degree to which business goals for which the web site was deployed are actually achieved. As the WWW emerged as a major medium for business applications, evaluating the effectiveness of a web site has gained in importance. Nevertheless little research has been conducted into evaluating web site effectiveness.

In this paper, we propose a model to evaluate the effectiveness of a company web site, based on the balanced scorecard concept. The proposed model not only measures the contribution of the web to the organization but also provides a foundation for strategic management of the web.

The proposed model evaluates all activities that take place on the web from the following six perspectives: business value, operational excellence, customer value, web site interface, management/maintenance, and learning and innovation. We suggest potential measures to implement each perspective and identify their inter-relationships in order to show how the result of these measurements can be interpreted. Finally, a case study is demonstrated to show how the model can be applied.

Keywords: Web site evaluation; Balanced scorecard; Electronic Commerce; Performance measurement and evaluation; World Wide Web

1. Introduction

1.1 Research background

The World-Wide-Web has emerged as a major medium for business applications. Countless organizations are exploring how they can best use the Internet for business applications, such as marketing, supply chain management, public relations, customer support, product sales, and electronic data interchange. While some Internet-active companies follow well-prepared business plans, others simply create web pages. Similarly, some companies gained substantial benefits from their Internet activities, yet others are learning 'the hard way' [23]. Hence, the following types of questions are asked more frequently than ever before: What is the economic contribution and the strategic potential of web sites [23]? How can managers evaluate the effectiveness of a web site [14]? To provide answers to these questions, this paper proposes a model to evaluate the effectiveness of a company web sites.

In this paper, we define the effectiveness of a web site as the extents to which business goals for which the web sites were deployed are actually achieved. We focus on a company web site mainly intended to support traditional business functions and business-to-customer activities. The reasons why it is critical to measure the effectiveness of a company web site are apparent from the following two facts.

- (1). The strategic importance of web sites continues to escalate. If developed and managed effectively, the web will provide substantial competitive advantages to the company.
- (2). Many electronic commerce projects fail because most companies have not established criteria for measuring the benefits or success of such projects [4].

The web presents tremendous strategic potential for most companies. Some researchers show a linkage between competitive advantage and the business value of web-based electronic commerce [3]. Hence, to guide and ensure the success of a web site, it is critical to evaluate whether or not the web is actually achieving its goals. Renowned management scholar Peter Drucker observes that unless managers can measure the effects of their actions they cannot manage [33].

According to the research of CommerceNet, many electronic commerce projects fail because most companies have not established criteria for measuring the success of their web sites [4]. The research reports that a marketing manager in major technology company recently confessed that his company was not fully supporting their web program because it did not show a return on investment. The major problem was a dissonance between the stated goals of the e-commerce initiative and management expectations. The original intent of the web program was to improve customer support and loyalty. However, management was more interested in direct benefit from the web. Since the gains made in customer satisfaction cannot be easily transformed into short-term financial revenue, the web program was not viewed as successful by upper management. Hence, to give convincing evidence to upper managers, it is needed to evaluate the effectiveness of web sites.

1.2 Problem definition

Currently, many firms which specialize in a web site evaluation have established their own methodology to evaluate a web site. However, they cannot deal with the problem of effectiveness defined in this paper. More specifically, they present the following problems:

- They did not consider various benefits that the web could give to the company. The effectiveness of the web site cannot be evaluated by using only a single measure, such as increased revenue or increased web site traffic. In order to fully evaluate the effectiveness of the web site, all activities that take place on the web should be

considered [26].

- They cannot communicate goals and strategies of the web site. A successful web site requires well-defined strategies and goals [25][3]. Hence, measurement methods must reflect these goals and strategies. In other words, a measurement method must be able to evaluate whether these goals are actually achieved in a consistent manner.
- They cannot capture an intangible return. Intangible benefits are as valuable as tangible benefits.
- They cannot tell us what course of action should be taken. A measurement method should not be seen only as a record of results achieved. It also should provide a decision support tool for web managers. A good measurement system must be able to link the measurement results to a strategic decision

This paper tries to solve the problems mentioned above by deploying the balanced scorecard concept. In this paper, we propose a model to evaluate the effectiveness of a company web sites using the balanced scorecard concept. The proposed model can be used not only to measure the contribution of the web but also to guide the activities of web site management processes and to support strategic decisions.

2. Related work

2.1 User-centric approach

User-centric approaches focus on external stakeholder (user) perspectives. The most popular approaches are customer satisfaction survey, e-mail content analysis, and web usability test.

Customer satisfaction is one of the most important dimensions for evaluating web site effectiveness. Much literature on web site design and evaluation are dedicated to identify the factors that satisfy web users [10][35]. Common methods to measure user satisfaction are pop-up surveys, e-mail/web surveys, and customer focus groups [24][32]. Content analysis of e-mail containing comments, questions, and feedback on a web site provides valuable insights into the kinds of informational needs of users and the types of problems they encounter with the site. Some projects for web site evaluation included e-mail content analysis to classify and analyze e-mail messages from their client's customer [13][24]. Web usability tests provide high quality information about the extent to which a web site or application meets user's needs, and the extent to which it can be readily used and learned [2][24].

Currently, many web research projects and web site evaluation firms have established their own methodologies for evaluating the effectiveness of web sites. These methodologies are mainly composed of user-centric approaches explained here, and traffic-based approaches explained in the next section. However, in the business context, their methodologies cannot address whether user satisfaction or high web site traffic is linked to meaningful output, such as increased revenue.

2.2 Traffic-based approach

Current web technology enables a web server to log all activities that take place on the web, including data such as the IP address and/or domain of the individual requesting a web page from the server, the date and time the request was made, the filename of the page accessed, and the number of bytes of data served [6]. Web site traffic can be analyzed by using log data. Some papers shows what information can be extracted from log files [6][16], and how this information can be extracted [34]. A wide and growing variety of software programs exist to analyze web log data. One of the most important methodological areas of this type is the use of software to monitor, analyze and report on the utilization of the site.

2.3 Investigative approach

Some researchers have investigated what value or benefits the web medium gives to the organization. Masotto examined a number of ways a WWW site can benefit a company and enumerated various metrics that should be considered when evaluating a web site[26]. However, he neither considered interrelationships and trade-off among metrics nor showed its applicability and managerial implications.

Leobbecke et al. developed a conceptual framework for assessing the benefit of on-line services offered by television stations[23]. However, some limitations exist in their framework. First, quantitative evaluation is difficult because they mainly focused on qualitative factors, not quantitative ones. Second, its applicability to the other business sector is very low because their framework is too specific to the area of television stations.

2.4 Quantitative evaluation

Quantitative web site evaluation models have been previously studied by many academics. Selz et al. developed a model to evaluate successful electronic commerce applications[30]. The research project of the National Computerization Agency in Korea established a model to evaluate interfaces of a cyber shopping mall[20]. Some researchers focused on a business-to-business web site [9]. However, most researches in this area mainly focused on evaluation of web specific features, such as design, contents, technology, web site functions, and media characteristics of the Internet rather than the value of a web site.

3. The balanced scorecard

3.1 Introduction to the balanced scorecard

The initial thinking on the balanced scorecard (BSC) concept was presented by Robert S. Kaplan and David P. Norton[17]. They have argued that traditional financial accounting measures (like the ROI and payback period) offer a narrow and incomplete picture of business performance, and that a reliance on such data hinders the creation of future business value. As a result, they suggest that financial measures should be supplemented with additional ones that reflect customer satisfaction, internal business processes, and the ability to learn and grow. Their BSC is designed to complement financial measures of past performance with measures of the drivers of future performance [18].

In viewing a company from four vital perspectives (Figure 1), the balanced scorecard is intended to link short-term operational control to the long-term vision and strategy [29]. The most important principles for building a balanced scorecard are: (1) find a clear cause-and-effect relationships among different measures, and (2) combine outcome measures with performance drivers. Figure 1 shows four perspectives included in a balanced scorecard and the relationships between them [17][19].

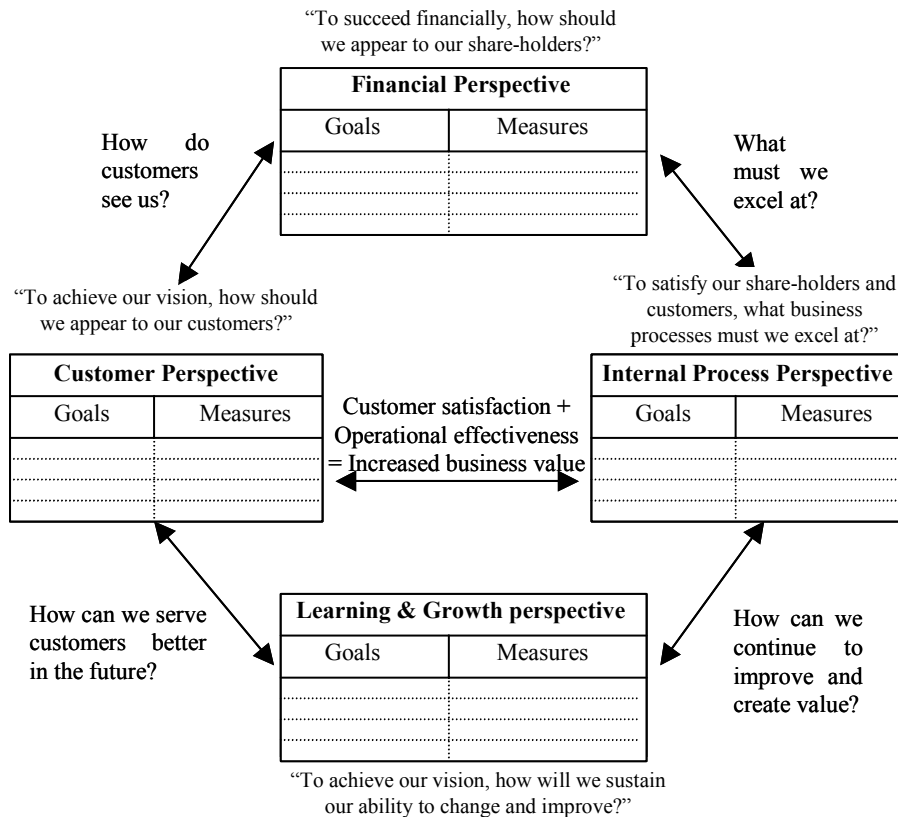


Fig. 1 The balanced scorecard

3.2 The balanced scorecard as a web evaluation tool

Many perspectives are to be regarded when evaluating the effectiveness of a web site, because effectiveness of a web site cannot be decided with a single assessment dimension or tangible metrics. Web site's effectiveness stems from excellence in internal business process and usability in web site management. Namely, effectiveness of front-ends(web site management) and back-offices(excellence in internal business process) are both essential to measure the total effectiveness.

The balanced scorecard is designed to measure the performance of business

If a BSC is adopted to evaluate a commercial web site, the following advantages can be taken:

- A balanced scorecard makes it possible to evaluate managerial activities with unbiased viewpoints by providing both tangible financial aspects and intangible non-financial aspects [1].
- The balance scorecard is a goal-oriented system. To evaluate web site effectiveness in a consistent manner, we must begin with the goals or objectives of the web site [29].
- The balanced scorecard can describe interrelationships among different factors. By analyzing these relationships, we can learn what should be done to achieve better outcomes [5].
- The balanced scorecard pursues overall optimization through balanced view of various perspectives. To fully evaluate the effectiveness of the web site, we must evaluate all activities that take place on the web.

4. Process of building a balanced scorecard

4.1 Finding out the business objectives and CSFs of a commercial web site

To develop a model for web site effectiveness, first we identified the business objectives of company web site and critical success factors. The business objectives of a web site indicate the direction where a model should be heading and critical success factors shows which factors will have the greatest effect on the outcome. In order to identify the major business objectives of company web site and critical success factors to achieve these objectives, an extensive literature review was conducted.

The literature review identified four major categories of business objectives of company web site [11][22][28][31]. Table 1 lists the categories with specific objectives and goals in each category. In this paper, we focus on the business-to-customer activity of a commercial web site. Though business-to-business commerce is also an important issue, it is beyond the scope of this paper. Hence, support of business partner category in Table 1 is excluded from further consideration.

Table 1 The business objectives of a company web site

Categories	Specific goals and objectives
Value addition	Create and enhance brand/corporate image
	Enhance public relations
	Establish company presence on the web
	Generate sales lead
	Sell products and services directly on the web
Marketing & customer service	Build relationship with customers
	Advertising specific products and services
	Provide effective customer support and services
	Collect customer and market related data
Enhancement of operational excellence	Improve internal communications
	Develop new product capabilities
	Reduce operational costs in marketing, customer support, and information dissemination
	Reduce time-to-market
Support of business partner	Improve business-to-business relationship
	Streamline corporate purchasing processes
	Provide necessary information to business partners

The critical success factors of web sites are categorized into five categories. Table 2 lists the categories and specific factors in each category. These critical success factors enable us to focus on what is important and provide a basis for developing key measures [29].

Table 2 The critical success factors of web site

Categories	Specific factors
Customer aspect	Product/service customization
	Additional information provision
	Improve the quality of customer service and support
	Understanding of customer needs
	Collection of customer related data
Management and maintenance	Integration of web activity with other departments
	Web site promotion
	Customer interaction and involvement
	Quick response to customers
	Up-to-date information
Technology	Investment and assistance
	Technological performance and capacity
	Preparation for technological change
	Overall site design

	Overall site design
	Security and investigation protection
	Page download speed
Product and service innovation	New service/product initiation

4.2 Cause-and-effect relationships among web site's goals

Before developing a model for evaluating website's effectiveness, we identified inter-relationships among different goals and critical success factors. These relationships help us to develop a model that is internally consistent. From our literature review, we identified cause-and-effect relationships among business objectives of company web site and their critical success factors, which was presented in the previous chapter. In this section, we elaborate these cause-and-effect relationships. Figure 3 shows cause-and-effect-diagram among different goals and critical success factors.

A company can enhance their strategic position by using the web as a source of additional business value. Typically, business value can be added by improving a brand/company image, establishing customer relationships, enhancing public relations, generating sales lead, and directly selling products and services on the web.

Another source of strategic advantages is to use the web as a means of improving operational excellence. Developing new product capabilities through the web is the most challenging aspect of this type of benefit. A large source of the benefits which the web can provide comes from changing the products themselves[3]. The web presents the tremendous potential for collecting and storing customer preferences. This allows for new products to be created or existing products to be customized in innovative ways. Cost reduction is another major concerns of many companies [31]. By sharing a digital infrastructure such as the Internet, marketing, distribution, and customer service costs can be drastically reduced. The web also allows a reduction of the cycle time associated with producing and delivering information and services [3].

In order to create business value from a web site, the company should be able to deliver high value to the customer through their web site. Value to the customer can be added by digitalization, product and service customization, additional information provision, and quality enhancement [12]. Understanding and collecting customer needs are critical to conduct these value-adding activities.

Effective management and maintenance is important to meet customer requirements. Many researchers stressed the integration of web activity with other departments [9][21]. A web site integrated with marketing, sales, and service activities usually works best [8]. Many literatures also suggested web site promotion, customer interaction, a quick response time, and up-to-date information be critical activities to satisfy web users [10][9][7].

Web site promotion is important to attract potential customers and to increase web site traffic. Interaction with customers will help to establish and maintain relationship with customers and to building up the credibility of a web site. The response time to a customer request and un-to-date information will directly affect customer satisfaction. A top manager's commitment and assistance is also critical to succeed with a web site [9][7].

Web site interfaces, such as design, navigation, and security are also critical factors, because without guaranteeing the quality of these interfaces to some extent, customers are highly dissatisfied with a web site. Hence, the quality of a user interface affects customer's value perception to a web site.

Technology is a major enabler for constructing an effective web site. Considering the high growth rate of web technology, it is critical to prepare for technological change [7]. Continuous innovation is an important factor for most companies to gain a sustained competitive advantage from their web site [3].

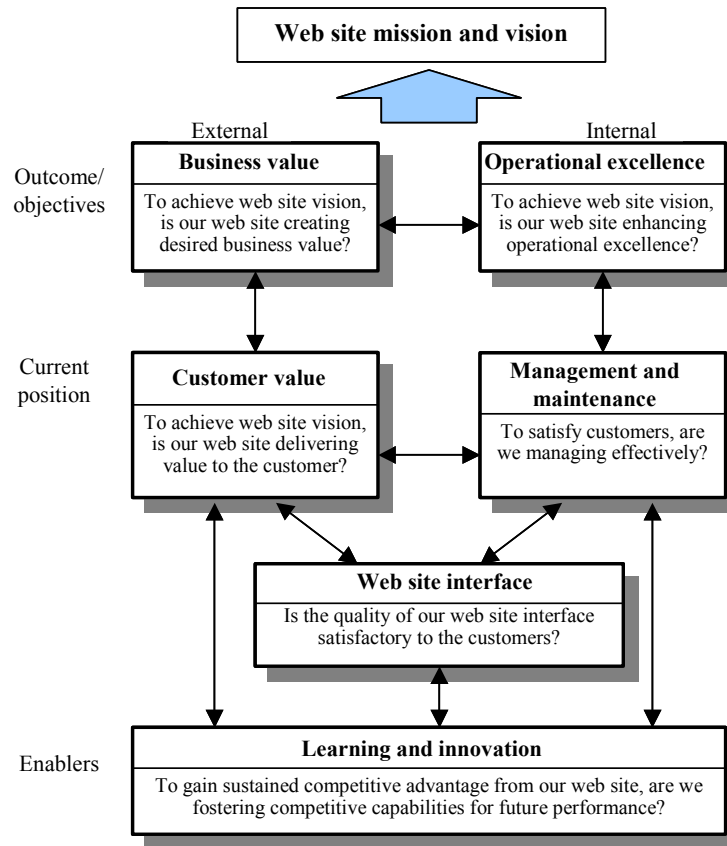


Fig. 3 A model for evaluating the effectiveness of a company web site

The ultimate goal of a company web site is to create business value and/or improve operational excellence to achieve its specific mission and goals. Business value is related to benefits from outside the organization, such as increased market share, increased sales, and an improved corporate image, while operational excellence focuses on internal benefits, such as reduced time-to-market, and reduced cost. The reason for dividing these benefits into two separate perspectives, business value and operational excellence, is to stress the inter-relationship between them. For example, improved operational excellence, such as reduced time-to-market for informational goods and services, can create additional business value, e.g. increased sales. Hence, to better understand the opportunities that the web can give us, we need to clearly understand these relationships.

Business value can be achieved by delivering high value to the customer through the web because high value perception of customers enhances customer loyalty, which leads to increased sales, improved company image. The web provides new ways to create and/or add value to the customer, which could not provided in the traditional way of running businesses [12]. Value to the customer can be added by digitalization, product and service customization, additional information provision, and quality enhancement. The customer value perspective focuses on whether the web adds value to the customer. Customer value is related to product/service offerings through the web which should be discriminated from the context (i.e. user interface) which constitutes basic environment for users to conduct certain tasks [35].

Web site interfaces, such as design, navigational efficiency, security, and page downloading speed, are not directly linked to customer value. However, we place web site interface as a separate perspective in our model, because it

contributes to customer dissatisfaction. Obviously, a web site interface in itself does not create customer value or customer satisfaction because they are extrinsic to the content that a customer desires [35]. A web site with poor design or complex navigational structure, however, can cause customers to become dissatisfied, which will lead the customers to depart from the web site.

Web site management and maintenance affects customer value, operational excellence, and quality of web site. As noted in the earlier section, a successful web site requires effective management processes. This process should include management of other departments related to the web, as well as management of the web site itself.

The learning and innovation perspective focuses on technological learning, understanding customer needs, and continuous innovation. Rapid progress in the area of web technology will force companies to adapt quickly and offer them an opportunity to experiment with new products, services, and processes [3]. Therefore, it is critical that these organizations quickly become familiar with the new technology. It is also important to understand customer needs and market situation to offer better products and services. Both type of learning provides new capabilities which will drive future performance.

Continuous innovation is also critical to gain a sustained competitive advantage from a web site. With time, technologies gain maturity, which reduces the cost and effort to implement systems. This allows competitors to promptly catch up with new offerings. For example, when Federal Express launched its web site (November 1994), allowing customers to track packages on the web, United Parcel Services (UPS), its major competitor, quickly accelerated its development efforts, which resulted in launching a similar service, although six months after Federal Express [3]. Hence, to gain a sustained competitive advantage from their web site, a company should continuously innovate services and products.

Table 3 Mission and goals in each perspective

Business value	Operational excellence
Mission: Add business value to the company	Mission: Enhance operational excellence
<i>Key factors:</i> Create/improve company image Establish relationships with customer Enhance public relations Generate sales lead	<i>Key factors:</i> Develop new product capabilities Reduce time-to-market Reduce operational cost
Customer value	Management and maintenance
Mission: Deliver value-adding products and services to customers	Mission: Manage and maintain a web site in an effective manner
<i>Key factors:</i> Enhance customer loyalty to the web Customize products and services Provide additional information Improve customer service/support Enhance quality of contents Understand customer needs Collect customer information	<i>Key factors:</i> Integrate web activity with other departments Promote web site continuously Facilitate customer interaction and involvement Respond quickly to customer request Maintain up-to-date information Invest and assist
Web site interface	Learning and innovation
Mission: Enhance the quality of user interface	Mission: Prepare future challenges and deliver continuous innovation
<i>Key factors:</i> Overall site design Efficiency of navigation Security and customer protection Page download speed	<i>Key factors:</i> Initiate new and innovative services Research into customer and market Prepare enough technological capacity Research into new technology Enhance web staff's capabilities

5. An application framework for measuring the effectiveness of a web site

5.1 Measures and metrics for each perspective

In this section, we suggest potential measures for each perspective in our model. The measures presented here are extracted from the literature on web site evaluation and performance measurement. These measures focus on measuring and evaluating key factors presented in Table 3. This allows us to focus on essentials and provides great simplicity.

In many cases, business value is captured in terms of increased sales, revenue, or profits. For companies using the web as a means of advertising and marketing existing products, the impact on existing sales can be analyzed to measure the value of their web site. Similarly, for companies whose objective is to process customer orders directly on the web, the total revenue or total sales directly generated by the web can be used. These measures are not new and many companies are already using them [31]. Impact on market share is also important because the web is an effective medium to reach new and worldwide customers. Customer retention can be measured by using the number of repurchased customers via the web, because loyal customers tend to take some actions such as repurchasing the product or recommending the product to others [15]. The most challenging aspect of measuring business value is evaluating the impact on corporate/brand image, because this might be one of the most intangible aspects to measure. As building a brand or corporate image is of prime interest in most companies [31], hence, in-depth analysis is needed. Potential measures for the business value perspective are listed in Table 4.

Table 4 Potential measures for the business value perspective

Business value
<ul style="list-style-type: none">• Impact on existing sales<ul style="list-style-type: none">– Increased sales– Number of sales lead generated by the web• Direct selling<ul style="list-style-type: none">– Total revenue generated by the web– Total sales generated by the web• Impact on market share<ul style="list-style-type: none">– Number of new customers acquired by the web• Customer retention<ul style="list-style-type: none">– Number of repurchased customers• Impact on corporate or brand image• Impact on public relations/communications<ul style="list-style-type: none">– Amount of information investors and analysts take directly from the web– Amount of information press takes directly from the web site

For measuring the effect on operational excellence, the impact on cycle time of information goods or services can be considered. This measure is especially useful in financial and information service industries where it is critical to distribute or receive a product as soon as it is created. Cost reduction is another major concerns for most companies. Cost savings in the area of marketing, customer services, and information distribution is a commonly used measure for measuring the benefits of the web.

The web presents tremendous potential for collecting and storing customer preferences. This allows for new products to be created or existing products to be customized in innovative ways. Hence, developing new product capabilities through the web is the most challenging aspect of this type of benefit [3]. This can be measured by using the number of new products/services developed from the web. Potential measures for the operational excellence perspective are listed in Table 5.

Table 5 Potential measures for the operational excellence perspective

Operational excellence	
•	Impact on product cycle time
–	Reduced time-to-market for information and services
•	Cost effectiveness
–	Reduced cost in marketing, customer service, information dissemination
•	New product capabilities
–	Number of new products/services developed due to the web

To measure the customer value perspective, we suggest two types of measures: one is an objective system usage data, and the other is subjective customer value perception to the web. Generally, a higher customer perceived value would generate more system usage data, such as increased hits on a particular page.

Customer loyalty to a web site can be assessed by the number of repeating customers. A cookie, a file placed on a client computer by the web site, is often used to recognize repeating visitors. A user authentication process can be also used to identify repeating customers. Site traffic and log analysis provide useful information about visitors and on-line behavior. Many software packages provide data on the number of visits, the user's location, the popularity of certain pages over others, and the path and length of the visit. By investigating which pages are popular, a company can modify a site to reflect usage patterns.

A customer's perceived value of the web can be assessed by a customer survey. Content analysis of e-mail, comments, questions, and feedback on a web site also provides valuable information about customer needs and the types of problems they encounter with the site. Moreover, analyzing questions about specific products and services provides insights on improvement areas, thus enables the development of new products based on customer needs. Potential measures for the customer value perspective are listed in Table 6.

Table 6 Potential measures for the customer value perspective

Customer Value	
•	Customer royalty to the web
–	Ratio of repeating customers to the total visitors (Cookie analysis, user log on)
•	Web site traffic
•	Log analysis
•	Customer perceived value of contents (Information/services)
–	Perceived quality of contents: usefulness, richness, timeless, accuracy, specialty, uniqueness/originality
–	The extents to which the web site meets customers' needs
–	Likelihood to visit site again
•	Contents analysis of e-mail, feed back, and questions about products/services

In the management and maintenance perspectives, we focus on the effectiveness ('doing the right thing') rather than efficiency because customer satisfaction is directly affected by effective management. A company should carefully monitor the management process to determine whether it satisfies customers. This includes integration of web activity with other departments (e.g. marketing, customer service) to better serve customers, maintaining up-to-date information, web site promotion to attract potential customers, and facilitating customer interaction and involvement. Potential measures for the management and maintenance perspective are listed in Table 7.

Table 7 Potential measures for the management and maintenance perspective

Management and maintenance	
• Investment and assistance	
– Total web related budget	
• Integration with other dept.	
– Communication frequency to other departments	
– Total time spent to communicating other departments	
• Up-to-date information	
– Update frequency	
– Number of broken links	
• Web site promotion	
– Expense related to promotion activity as a percentage of total web site budget	
• Interaction	
– On-line interactive components such as chat room, and e-mail	
– Response time to customer request	
– Number of customer request handled by the web	

The web site interface perspective focuses on user interfaces. Evaluation of design, navigation, and security can be conducted by employing experts from a specific discipline, such as web site evaluation, graphic arts, and human factors. In evaluating a navigation and interface, a usability test is quite useful to identify the probable incidence and type of usability problems encountered by users. Potential measures for the web site interface perspective are listed in Table 8.

Table 8 Potential measures for the web sit interface perspective

Web site interface	
• Quality of design	
– User friendliness: understandability, readability, clarity, unification	
– Aesthetics: attractiveness, creativeness	
• Navigational efficiency	
– Consistency of structure	
– Effectiveness of search engine, site maps, help	
– Usability	
• Security and customer protection	
• Page down load speed	

In addition to managing current performance, there is a need to measure and evaluate preparation for future performance. The learning and innovation perspective is concerned with: (1) continuous initiation of new services in order to sustain a competitive advantage, (2) continuously improving the capabilities of web staff to prepare for potential changes and challenges in the future, (3) preparing enough technological capacity in order to provide high quality of services to customers, (4) research into customer and the market to better understand future customer needs, (5) learning with technology in order to better exploit the opportunity with the technology.

When evaluating the capabilities of web staffs, it is important to consider their understanding of vision and goals for the web, as well as knowledge about specific web technologies. A successful web site needs web staff with a strategic vision, an understanding of the various internal business processes which will be affected, a strong technological mastery, and graphical design skills [3]. Companies with proper staffing for site maintenance, including a Webmaster to spearhead the effort, enjoy the most success [9].

Data about technological capacity can be collected from a Webmaster and web staffs responsible for managing and administrating specific hardware and software. The data on technological performance provides a full picture of the performance of web technology and a basis for technological improvement.

When evaluating preparation for technological change, it should be also considered whether the investment plan is geared towards adopting technologies that are 'open'; that is, they are designed to communicate with other software and hardware [7]. Potential measures for the learning and innovation perspective are listed in Table 9.

These relationships represent specific strategies of the web and provide useful information about what we must do to achieve better outcomes. For example, additional sales can be generated by enhancing customer loyalty to a web site. Customer loyalty comes from high perceptions of value, which is, in turn, a result of value adding activities, such as customization, and additional information provision.

A company can focus on specific relationships according to their strategy. Appropriate weights or priorities can be assigned to each measure and relationship to focus on specific area.

It is important to monitor these measures on a periodic basis in order to identify whether some performance drivers actually generate meaningful outputs. For example, we must examine whether an increased traffic really generates additional sales. If not, appropriate action should be taken. Proving the linkage between outcomes and performance drivers is important to give conviction to managers. For example, a company may use the web as a means of marketing which have made customers more aware of the company but have not yet led to increased sales. However, managers may be more interested in immediate return on investment. In this case, we can provide convincing evidence to managers by showing that the marketing activities will generate additional revenue in the long run.

6. A Case Study

In this section, we illustrate how the model can be applied to a company, Company M. Company M is online shopping mall which sells thousands of products. Annual sales amount to 20 million dollars.

Data related to each perspective was collected through interviews, internal questionnaire, and web log analysis. Time related data, such as revenue, sales, cost, and site traffic, was collected for six months, from October 2001 to March 2002. The measures were selected according to specific mission and goals of Company M. The overall evaluation result of the Company M web site is presented in Table 10.

Among the six perspectives, some metrics of the customer perceived value and the web site interface were evaluated by a questionnaire. A ten-point scale response format, which ranged from 1 (highly dissatisfied) to 10 (highly satisfied), was provided. The questionnaire was sent to 250 randomly selected customers of Company M and 52 responses were returned.

Table 10 The BSC table of Company M(Oct. 2002 ~ Dec. 2002)

Business value	Operational excellence
# of employees(person): 25 Asset(\$): 2,279,264 Net Sales(\$): 7,258,523 Ordinary profit(\$): -846,065 Liabilities(\$): 892,417 Asset/employee(\$/person): 91,171 Net Sales/employee(\$/person): 290,341 Profit/employee(\$/person): -33,843 Liabilities/employee(\$/person): 35,697	# of daily customer inquiry: 3 The % of appropriate response to customer inquiry: 100% Avg. delivery time after order fulfillment: 3~5 days # of payment methods: 3 Response time to customer inquiry: within 1 hour # of response channel to customer inquiry: 1
Customer value	Management and maintenance
The total # of members: about 40,000 % of transaction conducted by members: 3% Avg. page views per day: 25,000 Avg. visits per day: 5,000 Customer assessment (10 points scale) ■ Product diversity: 8.5 ■ Detailed product information: 8.5 ■ Timeliness sales in popular product: 6.1 ■ Transaction procedure: 7.3 ■ Customer inquiry: 5.3 ■ Revisit possibility: 4.9	Total cost for managing the web site: \$ 1538 dollar Frequency of contents update: everyday Total cost for web site promotion: \$2000/year # of specific events for promotion: 4/year Security level: High (firewall and SSL encryption)

Web site interface	Learning and innovation
Customer assessment (10 points scale) ■ Usability: 7.1 ■ Attractiveness: 6.2 ■ Navigation efficiency: 7.5 ■ Contents search: 8.6 ■ Consistency of site structure: 8.5	# of web management staffs: 2 Technological capacity: One million hit Frequency of hardware upgrade: one year R&D investment: \$21400/year

The result of the customer survey provides some insight into the improvement area of Company M's web site. Many customers expressed dissatisfaction with current services and the quality of design and navigation. Especially, the low page download speed was a major complaint from customers. Retarded responses to trendy products were unsatisfactory to customers and caused low revisit probability. In general, profit margin of trendy products is bigger than that of common products and sales increase in trendy products lead to profit increase. Functionality to support customer inquiry to product items and services is evaluated as a weak point. We also concluded that site promotion program doesn't give attractiveness to customers. In reality, Company M expended only 0.44% of total cost in its site promotion. Table 10 was evaluated and discussed by managerial board of Company M. Figure 5 denotes, comparing with target level, relative satisfaction level of six perspectives.

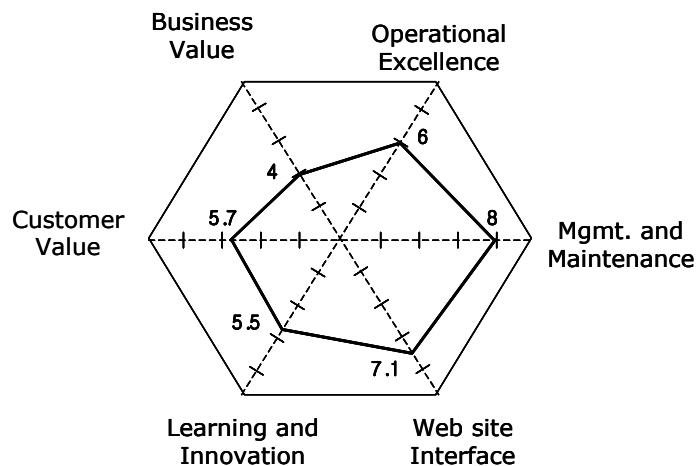


Fig. 5 Relative satisfaction level of the six perspectives(Oct. 2002 ~ Dec. 2002)

Though Company M generated much net sales for 3 months, October 2001 to December 2001, it also generated deficit shortage during the same period. The percentage of purchase done by the member of Company M and total amount of purchase done by visitor is very low. In learning and innovation perspective, the number of web management staff is not enough to support daily contents update. In Operational Excellence perspective, even though response time is sufficiently fast, it is pointed out that the answer can be seen only by its original questioner.

Considering cause and effect relationships denoted in the figure 3, some solutions to improve the problems revealed in discussing BSC results are suggested as follows:

- Tardy update of trendy products: by conducting market research
- Low percentage of repeating customers: upgrade the homepage to be more attractive one using the Flash animation
- Lack of site promotion program: by implementing various promotion program and shortening the frequency of promotion
- Closed inquiry mechanism: by introducing a new staff in charge of FAQ and Q&A and opening all inquiry to all customer
- Low percentage of purchase made by member: by enhancing customer loyalty using cyber coupon, cyber money,

mileage system, and customer communities

- Few staff for web site management: by increasing the number of web management staff and rearranging the tasks
- Low download speed: shortening the frequency hardware upgrade

Previously, Company M didn't have a rigid tool to evaluate the effectiveness of its web site. Therefore, it overlooked various aspects of evaluating web site effectiveness and it did not consider cause-and-effect relationships among various aspects. Hence, company M could not make future plans for long-term success and could not take detailed action to achieve better performance. We believe that our model presented in this paper provides useful guidelines for Company M web site in order to achieve long-term performances.

Table 11 shows that the BSC table for next three months, from January 2002 to March 2002. Figure 6 denotes relative satisfaction level of the six perspectives.

Table 11 The BSC table of Company M(Jan. 2002 ~ Mar. 2002)

Business value	Operational excellence
# of employees(person): 31 Asset(\$): 2,498,888 Net Sales(\$): 10,204,291 Ordinary profit(\$): 555,744 Liabilities(\$): 712,733 Asset/employee(\$/person): 80,609 Net Sales/employee(\$/person): 329,171 Profit/employee(\$/person): 17,927 Liabilities/employee(\$/person): 22,991	# of daily customer inquiry: 64 The % of appropriate response to customer inquiry: 98% Avg. delivery time after order fulfillment: 3~5 days # of payment methods: 4 Response time to customer inquiry: within 2.5 hour # of response channel to customer inquiry: 4
Customer value	Management and maintenance
The total # of members: about 125,400 % of transaction conducted by members: 11.3% Avg. page views per day: 44,500 Avg. visits per day: 9,600 Customer assessment (10 points scale) <ul style="list-style-type: none"> ■ Product diversity: 8.4 ■ Detailed product information: 8.3 ■ Timeliness sales in popular product: 7.9 ■ Transaction procedure: 8.5 ■ Customer inquiry: 8.1 ■ Revisit possibility: 7.6 	Total cost for managing the web site: \$ 2544 dollar Frequency of contents update: everyday Total cost for web site promotion: \$6100/year # of specific events for promotion: 12/year Security level: High (firewall and SSL encryption)
Web site interface	Learning and innovation
Customer assessment (10 points scale) <ul style="list-style-type: none"> ■ Usability: 7.8 ■ Attractiveness: 7.4 ■ Navigation efficiency: 8.0 ■ Contents search: 8.6 ■ Consistency of site structure: 8.1 	# of web management staffs: 5 Technological capacity: 1.5 million hit Frequency of hardware upgrade: every six month R&D investment: \$41800/year

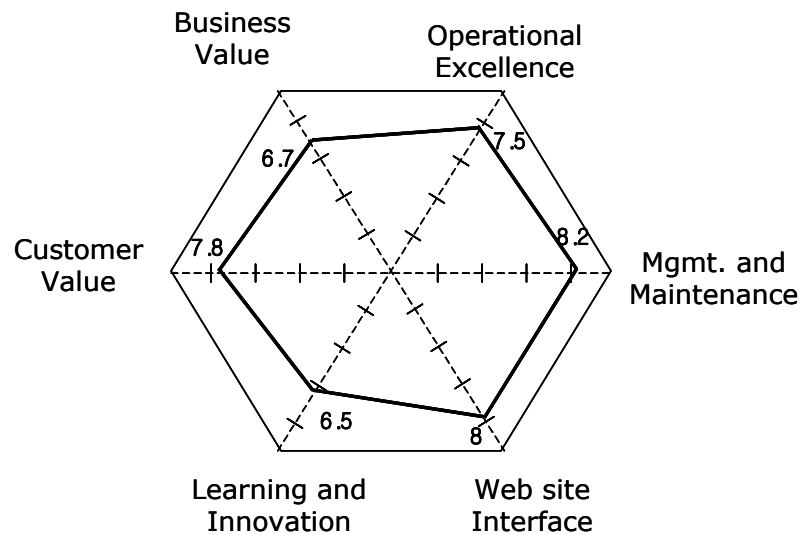


Fig. 6 Relative satisfaction level of the six perspectives (Jan. 2002 ~ Mar. 2002)

7. Conclusion and further study

In this paper, we proposed a model to measure and assess the effectiveness of a company web site. The model is composed of the following six perspectives: business value, operational excellence, customer value, web site interface, management/maintenance, and learning & innovation. We identified potential measures for each perspective and analyzed inter-relationships among different measures. Finally, the applicability of the model was demonstrated by a case study. The model presented in this paper is based on the following pioneering concept of the balanced scorecard.

- The balanced view of past, current, and future activities
- The cause-and-effect relationships to communicate business strategy
- The mixed use of outcome measures and performance drivers
- A systematic procedure to reflect missions, objectives, and goals

However, substantial change was made compared to the original balanced scorecard, according to business objectives of company web site and its critical success factors. Basically, the model was developed from analysis of cause-and-effect relationships among business objectives of a web site and its critical success factors.

The model represent a strategic web management tool that can be used to monitor and guide specific activities that take place on the web, as well as a evaluation tool for web site effectiveness. The model differentiated from traditional methods in the following facts.

- The model evaluates all activities that take place on the web from a balanced view of long-term/short-term perspectives and internal/external perspectives
- The model addresses business objectives of a web site
- The model can guide strategic decisions related to the web

However, further research is required to assess the effectiveness of a B2B(business-to-business) web site. B2B has some different characteristics from B2C (e.g. multi-partner relationship in a marketplace, limited number of customers and suppliers). The six perspectives, focused on a B2C web site, will be changed to reflect the characteristics. Partners in B2B marketplace are to be considered as a key objects when we develop new perspectives.

Acknowledgement

The authors would like to thank the Ministry of Education of Korea for its financial support toward the Electrical and Computer Engineering Division at POSTECH through its BK21 program.

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