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A Performance Measuring Framework for Electronic Commerce Businesses

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Abstract

As electronic commerce under the digital economy environment evolves rapidly affecting the structure of our economy and individual life styles, the need for metrics system to evaluate the performance of electronic commerce activities remarkably increases. Reviewing the characteristics of electronic commerce and some issues related to its measurement, this paper proposes a framework to measure the performance of electronic commerce business activities. The proposed framework customizes the balanced scorecard method for electronic commerce practices and can be applied effectively to electronic commerce businesses as an appropriate measure.

1. Introduction

In effect, the widespread of the Internet has facilitated the development of electronic commerce. Electronic commerce over the Internet has become a new way of conducting businesses. Despite only several years old, the Internet has the potential to radically alter some economic activities and the surrounding social environments. It links up most companies around the world in a way that the geographical boundaries and locations no longer pose hindrances to business transactions. The enormous potential of such fast growing form of transactions has become keen interests of many governments, international organizations and, in particular, business people who have to make well-informed decisions for their investment and strategies on electronic commerce.

Beside the Internet, other information technologies such as computer hardware, software and networks have transformed the way we conduct commerce, the way we work and even the way we live as well. Hence the various forms of information and communication technologies are also playing increasingly crucial roles in growth, capital investment and other aspects of electronic commerce activities. In any case, as electronic commerce under the digital economy environment advances rapidly affecting the structure of our economy and individual life style, the need for accurate standards of metrics to measure the performance of electronic commerce activities remarkably increases. However, the scope and solution methods of such electronic commerce measurement problems still remain unresolved and open to research issues.

This paper aims to propose a fundamental framework to measure the performance of electronic commerce business activities. In the next section, defining electronic commerce we present the several characteristics of electronic commerce. Section 3 reviews research issues related to measurement of electronic commerce and then deals with some points on measuring processes. Starting from the insight that new measuring system which can complement the drawbacks of the traditional measuring scheme is strongly needed, section 4 presents a framework to measure the performance of electronic commerce. The proposed framework customizes the balanced scorecard method for electronic commerce practices. Finally the last section concludes this paper.

II. Characteristics of Electronic Commerce

1. Definition of Electronic Commerce

Electronic commerce was defined by ECOM [3] as "Electronic commerce supports an entire range of activities - product design, manufacturing, advertising, commercial transactions, settlement of accounts - using a variety of computer networks.", and then by OECD [8] as "Electronic commerce refers generally to all forms of transactions relating to commercial activities, including both organizations and individuals, that are based upon the processing and transmission of digitized data, including text, sound and visual images." Afterwards, WTO [10] also presented a definition as "Electronic commerce entails the production, distribution, marketing and sale or delivery of goods and services by electronic means."

In the meantime, US Executive Office of the President [9] stressed the effects of the Internet as "The Internet will revolutionize retail and direct marketing. Consumers will be able to shop in their homes for a variety of products from manufacturers and retailers all over the world. They will be able to view these products on their computers or televisions, access information about the products, visualize the way the products may fit together (e.g. constructing a room of furniture on their screen), and order and pay for their choice, all from their living rooms."

Furthermore, European Commission [4] stated that "Electronic commerce is defined as about doing business electronically. It is based on the electronic processing and transmission of data, including text, sound and video. It encompasses many diverse activities including electronic trading of goods and services, online delivery of digital content, electronic fund transfers, electronic share trading, electronic bill of lading, commercial auctions, collaborative design and engineering, online sourcing, public procurement, direct consumer marketing and after-sales services. It involves both products (e.g. consumer goods, specialized medical equipment) and services (e.g. information services, financial and legal services); traditional activities (e.g. healthcare, education) and new activities (e.g. virtual malls)."

Nevertheless, no single definition of electronic commerce gives us a clear-cut understanding of electronic commerce activities. For a more comprehensive definition, the following definition can be derived from the various ones above. Electronic commerce refers generally to all forms of transactions relating to commercial activities, involving both organizations and individuals, that are based upon the processing and transmission of digitized data including text, sound and visual images. It also entails the electronic exchange of commercial information among organizations and the business processes that support commercial activities. Hence electronic commerce affects the scopes and forms of organizational management, commercial contracts, legal and regulatory frameworks, financial settlements and taxation involved in business transactions.

2. Characteristics of Electronic Commerce

The activities involved in electronic commerce have heterogeneous characteristics that differ from the characteristics of industrial goods and services. These various characteristics of electronic commerce stemmed from the mixture of advanced information technologies and managerial innovations may lead to diversified business activities and their performance measures. In this section, we classify the characteristics of electronic commerce into five different aspects.

◈ ***Unlimited Scope of Business Activities***

Electronic commerce tremendously expands the extent of business activities beyond the traditional practices and geographical boundaries. In fact, as more businesses connected to the Internet in the last decade, they could form new configurations and relationship among suppliers, customers, competitors and vendors without any limitation of location and time dimension. Through the Internet cyberspace with easy access, electronic commerce firms come to increasingly have the ability to communicate, interact and transact among them and eventually could extend to unlimited sphere of business activities. For instance, many digital libraries are easily encountered in the cyberspace, a number of internet shopping malls become prevalent around the world and new online distribution channels are constructed among the digital business communities.

◈ ***Enhancement of Customer Orientation***

As the information technologies enabled a great number of individual customers to link directly to electronic commerce companies, the tastes and preferences of customers are reflected directly to the firms. Consequently, electronic commerce over the Internet interaction causes individual customer needs more diversified and customer voices more powerful in the digital communities. In this situation, firms performing electronic commerce activities become more customer-oriented and increasingly make more efforts to satisfy individual customer needs since their competitiveness depends to a large extent on how well they support their customers.

♦ ***Acceleration of Structural Transformation***

The digital revolution radically alters the socioeconomic environments in that we live and operate businesses. To cope with the alterations, electronic commerce firms, particularly the smaller ones change rapidly. What the firms perform this year may vary completely in the next year. Moreover, due to minimal barriers to entry, a number of new companies intrude rapidly into existing markets. Such environmental changes enforce firms to transform internal and external structures. In a hurry, they reengineer internal business processes and improve management strategies such as organizations, perceptions, practices and workforces, and make managerial and technical innovations. At the same time, firms experience the transformations of vertical restructuring such as outsourcing and market structure that eventually give rise to inter-business M&A and strategic affiliation.

♦ ***Global Extension***

Electronic commerce leads the world economy to become more global in its operation and oblivious to national boundaries. Most of business information are not located solely within the border of any country but scattered more widely abroad, and many of the websites and networks of firms in any country are hosted or maintained by parent companies located overseas. As such global extension prevails, actual global boundaries become increasingly fluid. The new structures of global outsourcing and distribution channel are formed. Under these environments continuously changing, electronic commerce firms are ceaselessly enforced to strengthen the global competitiveness.

◇ *Increased Use of Information and Knowledge*

One of the most significant distinctions of electronic commerce is that information and knowledge play important roles in business operations. As the advanced information technologies have recently accelerated knowledge accumulation and information processing for decision-makings of management, the use of knowledge by individual customers and businesses, and sharing and exchange of information among businesses or between businesses and customers have remarkably increased. Hence most of electronic commerce firms place great stresses on intangible assets such as knowledge, skill, information and intellectual properties as their major input business resources since they could create more added value than many tangible assets. For that reason, accurate quantification and measurement of such intangible assets emerge as major research issues.

III. Measurement of Electronic Commerce

1. Measuring Issues of Electronic Commerce

The needs for electronic commerce metrics increase gradually. Recognizing the fact that electronic commerce is dynamic and diverse in nature, many firms struggle to identify and measure the impact of their electronic commerce initiatives in order to arrive at better planning and development. In fact, based on the common set of definitions and characteristics of electronic commerce provided in the previous section, most of global firms require the internationally recognized standards for electronic commerce measurement frameworks that should reflect the performance and any corrective actions of electronic commerce under the global market environments.

Despite the significance of electronic commerce measurement in the worldwide economy, the overall consensus has not been reached as to what metrics to use. It is somewhat difficult to measure electronic commerce for many reasons. The characteristics of electronic commerce in the previous section actually complicate the measuring problems. In addition, it gets increasingly difficult to separate electronic commerce activities from traditional businesses since traditional firms also begin to perform online businesses as well. When firms perform both the traditional businesses and electronic commerce simultaneously, the distinction between the values of these two activities fades.

When we analyze the characteristics of electronic commerce and identify their limitations, we come to a conclusion to devise the new measurement system that can quantify tangible values as well as intangible worth of electronic commerce. To develop such proper measurement system, firms need to establish the metrics standard and the indicators that, while responding to strategic requirements, capture the key elements and processes of operational electronic commerce activities.

2. Measuring Strategy and Processes

By many scholars, it is agreed that the traditional financial measure alone is insufficient to quantify the complex behavior of electronic commerce. The metrics should have ability to measure the tangible and intangible benefits. In short, Colecchia[1] of OECD outlined the following points and processes to construct the comprehensive measurement framework for electronic commerce

♦ Develop a set of definitions that considers not only the traditional aspects of electronic commerce but also its broader economic impacts.

◇ Develop electronic commerce metrics and functional analysis that capture not only the size and growth of electronic commerce but also fundamental changes in the economy.

◇ Develop internationally comparable electronic commerce metrics that can be used to analyze the comparative advantages and disadvantages that might exist in different countries.

◇ Develop new indicators that better reflect the nature and behavior of electronic commerce marketplace such that indicators should concern all dynamic aspects of market creation, structure, participation and interaction among actors.

◇ Capture the broader impacts of electronic commerce on the economy by improving the measurement of key components of productivity.

◇ Set priorities for measurement to make use of limited resources for system development.

IV. Proposed Measurement System

Reviewing the characteristics and behaviors of electronic commerce in the previous section reveals that the balanced scorecard method based on the works of Kaplan and Norton [5][6][7] proves appropriate to measure the performance of electronic commerce activities. We first overview the balanced scorecard system in the following section.

1. Overview of Balanced Scorecard

The balanced scorecard method is a framework both for business planning and performance measuring. Kaplan and Norton [5] stated the balanced scorecard model as a set of measures that gives top management a fast but comprehensive view of the business. The balanced scorecard includes financial measures that tell the results of actions already taken and complements the financial measures with operational measures on customer satisfaction, internal processes and the organization's innovation and improvement activities. The operational measures eventually function as the drivers of the future financial performance.

The balanced scorecard method is more than measurement technique. It works as rather a management tool or, in fact, a strategic performance management system. As an executive dashboard, the balanced scorecard method of Kaplan and Norton turns business strategic objectives into specific key measures using a few well-designed metrics derived from the following four perspectives that constitute the central drivers of shareholder value creation.

♦ Financial Perspective
♦ Customer Perspective
♦ Internal Business Perspective
♦ Innovation and Learning Perspective

2. Customization of Balanced Scorecard for Electronic Commerce

When we consider the distinctive characteristics of electronic commerce firms described above, the following four perspectives need to be established in customizing the Kaplan's balanced scorecard methodology to the measurement of electronic commerce business performance. These four perspectives can constitute the primary part of the balanced scorecard system of electronic commerce industry. We also deploy the possible key performance indicators for each perspective as below.

♦ ***Financial Perspective***

All the organizations need the financial perspective to represent their operational performance to shareholders by means of traditional financial measures such as revenues, expenses, profit margins and return on investment (ROI). Typically starting from such questions as "How do we look to our shareholders?" and "How healthy are the revenues and profits of our organization?", the financial perspective provides more fundamental and foundational information of the organizations.

In order to obtain good results of financial measures, the business processes should be in optimal, and the input resources should be allocated by proper priorities and utilized efficiently. Moreover, the other three perspectives below should be constructed in balance to be used in complement. Despite some shortcomings, the financial measures should not be underestimated because no other measures can replace them in providing accurate financial information.

Since determining key performance indicators usually constitutes the major part of the balanced scorecard development, we consider some possible indicators for the financial perspective of electronic commerce firms. Several indicators can be finally chosen out of the following depending upon the type of products and services and the strategic plans of the company.

1)Gross profit margins
2)Gross sales
3)ROI (return on investment)
4)Cash flow
5)EPS (earnings per share)

◇ ***Internal Process Perspective***

The process perspective provides indications of how well business processes of a company currently work. The process perspective substantially stems from such questions as "What internal processes must our company excel at?" and "How does the internal process support the other 3 perspectives?". In reply to these questions, the process perspective can track production output, defects in the products, customer complaints, machine downtime or missed shipments.

The internal process perspective should be linked to what the company needs from other performance measures in order to achieve its goals. If the strategy of the company focuses on technical innovation and product quality, the perspective concentrates on incorporating of sufficient resources into research and development and quality enhancement activities. In particular, the internal process perspective is important since it not only indicates the final consequences of business processes but also provides the management with business insights when they need to be more predictive and prompts them to seek out opportunities taking initiatives to solve any problems.

For the internal process perspective of electronic commerce firms, the following key performance indicators can be used in developing the balanced scorecard system.

1)New product/service development cycle
2)Asset utilization
3)Employee productivity
4)Cost reduction
5)Quality enhancement

♦ ***Customer Satisfaction Perspective***

As most of electronic commerce firms around the world give priority to customer oriented activities these days, they often ask themselves such questions as "How do customers see our company?", "How is the quality of our products or services perceived?", "How can we deliver more value to our customers?" and "How much did our company improve customer relations, increase prospects and bring in new customers?".

The answers to these questions and other customer satisfaction activities can be categorized into three types of endeavors; quality improvement, cost reduction and delivery expedition. Basically, in order that the value delivered to clients should increase, firms make every effort to improve the quality of products and services, to reduce the costs of them and to deliver them at the right time. Such efforts include those towards intangible asset creation such as customer loyalty, improved service quality, enhanced user experience and brand recognition.

The customer satisfaction perspective can include the following key performance indicators when we develop the balanced scorecard system of electronic commerce firms.

1)Number of customers
2)Market share
3)Annual sales per customer
4)Customer satisfaction index
5)Brand image index

◈ ***Global Competition Perspective***

To cope with keen competition over the world, most of the electronic commerce businesses make every effort to solve such problems as "How can we continue to improve, innovate, create values to secure global comparative superiority?", "How should we react to sudden market transformation?", "How can we learn from our competitors?" and "What new and relevant technologies do we develop?".

Such global competition environments inevitably enforce them to make continuous improvements in their existing products, manufacturing processes and new product development activities. This is because only by increasing the firms' abilities to develop new products, create more values for customers and improve operating efficiencies, they can continuously expand new markets and eventually obtain the global competitiveness.

Besides information technology investment, most of knowledge-based businesses emphasize human resources. Many scholars including Drucker[2] have stated that the most valuable assets of the 21st-century corporations would be their knowledge workers. Such knowledge employees are intangible assets that appreciate as they increase their knowledge-based activities. Like all other assets, the human resources need to be preserved and measured properly.

When the electronic commerce firms implement the balanced scorecard in practice, they can select key performance indicators for the global competition perspective from the following list depending upon their visions and strategies.

1)Expenses for information technologies
2)R&D expenses
3)Expenses for new market development
4)Number of patents
5)Motivation index

3. Development of Customized Balanced Scorecard

The balanced scorecard system requires the management of firms to introduce four new management processes that, separately and in combination, contribute to linking long-term strategic objectives with short-term actions. The prior process to incorporate the balanced scorecard methodology into a firm usually follows the next four steps as mentioned in [7].

♦ Translating the vision

◇ Communicating and linking
◇ Business planning
◇ Feedback and learning

We should pay attention to some points when we practically develop the balanced scorecard system of electronic commerce businesses. First, choosing the wrong indicators or weighing the four perspectives improperly may cause output performance to deteriorate in the reviewer's mind. If the performances are not consistent with the organization's strategy and goals, the deterioration worsens. Secondly, if the measurements are not consistent throughout the organization, employees may suspect a managerial bias and develop a negative attitude. Finally, the process also presumes competence in employee job performance. To make up these limitations, managers need to adhere as closely as possible to the original premise of Kaplan and Norton [5][6][7].

V. Conclusion

In an attempt to precisely measure the performance of the electronic commerce, we propose a framework to outline electronic commerce metrics by considering both financial and non-financial impacts of electronic commerce activities. Analyzing the characteristics of electronic commerce, we adopt the balanced scorecard method and customize it appropriate to measure the performance of electronic commerce businesses.

We establish four key perspectives; financial perspective, internal process perspective, customer satisfaction perspective, and global competition perspective, and then deploy several key performance indicators for each perspective to eventually apply to various types of electronic commerce firms and organizations. In practice, the proposed system is expected to be effective in precise quantification of comprehensive performance measures.

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