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Effect of Information Technology and Buyer-Supplier Partnership on E-business Environment

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Abstract

This study explores the effects of IT on buyer and supplier partnerships in the Taiwan e-business environment. The survey data reveals that the integration of IT and partnerships into supply chain management applications can improve e-business performance. Specifically, the study finds that IT utilization as well as buyer and supplier partnerships within supply chains are matured in the participating firms, as evidenced by their enhanced productivity, reduced cost and increased profit. Keywords: information technology, IT strategy, buyer and supplier partnership, e-business performance

1. Introduction

Due to the continuous innovation of technology and the characteristics of e-commerce, many companies have introduced the enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM), e-business and related electronic operating systems to upgrade their competitive advantage. All companies utilize IT to facilitate communication and data sharing between subsidiaries and the parent company in order to earn the greatest profit within the shortest time. In Taiwan, globalization and entering the WTO have made companies compete with not only other local firms, but also international competitors.

The manufacturers invest in advanced manufacturing technologies (AMTs) to smooth their production scheduling, standardize the production process, achieve punctual delivery and reduce costs. The information technology (IT) is evolving as a powerful force in the new marketplace where the nexus of competition has changed from individual firms to efficient supply chain networks both between firms and within industries. Among various channels, the supply chain has the closest partner relationship, because the interactive buyer-supplier relationship among companies is a mutual relationship instead of the traditional cooperation method.

This paper studies how advanced technology and IT applied by manufacturers will affect the partnership relationship and supply chain (SC) performance. We use a questionnaire sampling from manufacturers to collect information related to the degree to which firms use advanced technology, IT strategy models, partnerships with upstream suppliers and downstream buyers, as well as supply chain performance evaluation of the firm.

Statistical analysis is applied to evaluate the correlation and significant deviation and investigate whether advanced technology and IT strategy models will improve the partnership relationships and the supply chain performance.

2. Literature Review

2.1 IT and e-business

With the popularity of the Internet as a low-cost and easy-to-use media, e-business methodology helps companies reduce cost, as well as improve service quality and efficiency [6].

E-business transforms the conventional business process into a supply chain management and establishes a more dynamic buyer-supplier relationship and a strategic partnership [10]. The influence on customer relationship management includes the factors of accelerated information exchange, high degree of interaction and flexibility, as well as removal of time and geographical barriers [1].

According to the International Data Corporation [5], the number of Internet users will soar from 100 millions in 1998 to more than 500 millions in 2003. The open and global characteristics of the IT allow companies to provide e-business to users anywhere at any time with unprecedented width and depth.

A high level of IT capability has been shown to provide a clear competitive advantage, and it can be a differentiating factor in terms of company performance [7]. Bowersox and Daugherty [2] identified IT as one of the common factors associated with advanced logistics practices.

Specifically, the type of IT used largely determines the nature and quality of interactions the company has with customers, suppliers and trading partners. Prahalad and Krishnan [9] referred to IT as the company's "digital nervous system". However, although IT is a critical element of SCM, IT is not a source of value by itself. Rather, the proper selection of IT supports and enhances the functioning of value-added processes.

Managers are often faced with the challenge of selecting appropriate IT applications and setting realistic expectations of performance measures. Exacerbating the difficulty of this process are rapid changes in technology, proliferation of software intended to improve SC functioning, and a plethora of self-proclaimed success

stories [4] [13].

2.2 The partnership of buyer and supplier

Wong [17] showed that a real partnership should consider mutual requirements, the capability and target of each partner, as well as creating clear and definite vision. Vokurka [15], Maloni and Benton [8] described the supply chain partnership as the mutual relationship of two independent business entities, normally the supplier and the customer or buyer, in order to accomplish some certain target and profit. These entities share information with each other, improve the financial and operation performance of both sides via cost and inventory reduction, and undertake the risk together.

(1) The power of the partner

The relationships between buyers and suppliers are moving towards a reduced number of suppliers, long-term relationships, reduced inventories and involvement of suppliers in design. The power of the partner includes relationship between players and how the relationship is managed. The existence and position of power in the SC is an example of SC relationship. Chow et al. [3] concluded that there were related variables, like SC formalization, SC intensity, SC frequency, SC standardization and SC reciprocity.

(2) Supplier involvement

Vonderembse and Tracey [16] evaluated the correspondence between the supplier involvement and manufacturer performance. The suppliers were involved in product design and continuous improvement activities. Tracey and Tan [14] studied the relationship of supplier involvement with the customer satisfaction and performance. They also noted that the supplier involvement included the participation on product design and continuous improvement activities.

(3) Information exchange

Sandhya and Mrinalini [12] pointed out that the connections between manufacturer, supplier and buyer improved the efficiency of data transmission, and caused the information to be transmitted and shared immediately. Sanders and Premus [11] investigated the application IT to supply chain management, finding that the utilization of e-technology made the information flow smoothly, and made the firm or organization perform better in many ways. Collaboration of supply chain goes beyond mere exchanging and integrating information between suppliers and customers, and involves tactical joint decision making among the partners in the areas of collaborative planning, forecasting, distribution, and product design.

Sanders and Premus [11] also found that the investment and application of IT assisted the company or organization to perform better in terms of quality, flexibility, innovation capability, product entrance opportunity and new technology. The Supply Chain Council of the US also developed 12 indexes to measure the supply chain performance. Therefore, this paper

proposes the following hypotheses: with different IT portfolios, the performance of e-business will be affected by a supplier or buyer partnership.

H1: IT portfolio will affect the supplier or buyer partnership.

H1a: Higher involvement with IT will lead to closer supplier partnership.

H1b: Higher involvement with IT will lead to closer buyer partnership.

H1c: IT strategy model will affect the supplier or buyer partnership.

H2: IT portfolio will affect the performance of e-supply chain.

H2a: Higher involvement with IT will result in better performance of e-supply chain.

H2b: IT strategy model will affect the performance of e-supply chain.

H3: The supplier or buyer partnership will affect the performance of e-supply chain because of different IT portfolios.

H3a: The supplier partnership will affect the supplier performance on e-supply chain because of different IT portfolios.

H3b: The buyer partnership will affect the buyer performance on e-supply chain because of different IT portfolios.

3. Survey Methodology

This paper empirically investigates the relationships among variables and Figure 1 illustrates the architecture of this study. The major variables used have included: (1) the independent variables of supplier and buyer partnerships, which include the power of the partner, supplier involvement and information exchange; (2) the medium variables of the degree of e-business/IT, which includes the level of involvement with IT and the IT strategy model; (3) the dependent variable, which is performance evaluation of e-business, including information management, order fulfillment, inventory, distribution, product development, supplier management, customer satisfaction and after-service.

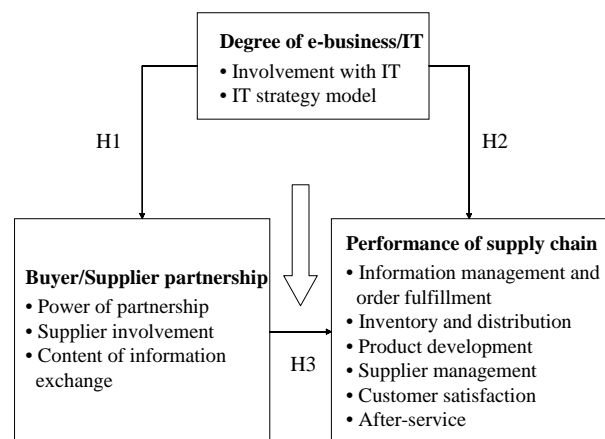


Figure 1 Architecture of this study

The questionnaire design has four parts: (1) the degree of e-business, (2) supplier partnership and its performance, (3) buyer partnership, and (4) the background of the company. The objects are sampling from the purchasing departments of 1000 major manufacturers in Taiwan, including food and drink, textile and garment, chemistry and petroleum, construction materials, pharmaceuticals, metals and machinery, as well as electronics and electric industries. Of the 945 questionnaires sent out, 22

questionnaires were returned due to change of address or failed e-mail address. Of those returned, 4 responses could not be used. There were 113 questionnaires returned, not including the invalid ones, for a valid response rate is 12.29%. The returned questionnaires were received from companies of different industries that is compliant with the spirit of sampling.

Table 1 Performance evaluation of e-business

Object	Dimension	Mean	Standard deviation
Supplier	Information flow management	3.457	1.992
	Order fulfillment management	3.681	2.075
	Inventory and distribution	3.555	2.038
	Product development and feasibility	3.454	2.018
	Partnership management	3.746	2.056
	Customer relationship management	3.673	2.005
	After service	2.296	1.292
Buyer	Information flow management	3.657	2.835
	Order fulfillment management	3.527	2.043
	Inventory and distribution	3.555	2.057
	Product development and feasibility	3.790	2.106
	Partnership management	3.725	2.000
	Customer relationship management	3.921	2.762
	After service	3.823	2.069

Table 2 Degree of IT application by industry

Dimension	Sub-dimension	Electronics & Electric industry	Traditional industry	Trading industry & others
IT application degree	Network establishment	60%	55%	48%
	Network method	30%	26%	18%
	Website establishment	100%	100%	100%
	Product inquiry service	83%	82%	75%
	Information outsourcing	27%	17%	26%
	Sharing information with partnership	35%	23%	29%
	Procurement management	23%	28%	17%
	Sales management	32%	30%	28%
	Production management	20%	24%	22%
	Logistics management	32%	30%	27%
	Communication and support service	60%	58%	55%
Supplier involvement	Product development/ design	32%	29%	26%
	Technology resource/information sharing	32%	38%	35%
Sharing information with supplier	Price	40%	37%	34%
	Delivery	61%	59%	60%
	Quality	41%	46%	37%
	Quantity	43%	36%	39%
	Sales planning	45%	36%	40%
Sharing information with buyer	Price	44%	32%	38%
	Delivery	60%	56%	58%
	Quality	38%	35%	31%
	Quantity	28%	37%	29%
	Sales planning	54%	47%	50%

Table 3 Supplier performance vs. supplier partnership

Industry	Dependent variable	E-business degree	Prediction variable	R ²	β	t value	p value
Electronics & electric industry	Supplier performance	High	Supplier partnership	0.704	0.799	10.543	0.000***
		Low		0.477	0.305	2.675	0.000***
Traditional industry	Supplier performance	High	Supplier partnership	0.506	0.754	9.452	0.000***
		Low		0.384	0.296	3.068	0.000***
Trading industry & others	Supplier performance	High	Supplier partnership	0.604	0.706	8.643	0.000***
		Low		0.393	0.231	3.172	0.000***

* p 0.1 (close but does not reach the level of significance); ** p 0.05; *** p 0.01.

Table 4 Buyer performance vs. buyer partnership

Industry	Dependent variable	E-business degree	Prediction variable	R ²	β	t value	p value
Electronic and electric industry	Buyer performance	High	Buyer partnership	0.501	0.602	6.013	0.000***
		Low		0.302	0.502	6.011	0.010***
Traditional industry	Buyer performance	High	Buyer partnership	0.492	0.701	5.017	0.040**
		Low		0.328	0.304	3.026	0.024**
Trading industry & others	Buyer performance	High	Buyer partnership	0.502	0.601	5.74	0.005***
		Low		0.387	0.259	3.016	0.030**

* p 0.1 (close but does not reach the level of significance); ** p 0.05; *** p 0.01.

4. Data Analysis

Table 1 illustrates the relative performance of different operation areas of the supply chain. Among the surveyed entities, 28 companies are coming from electronics and electric industry, 69 are from traditional industry and 16 are from trading industry or others. The important items include customer relationships, after-service, product development, supplier partnerships and order fulfillment. Table 2 shows degree of electronic IT application in the electronics/electric industry, traditional industry and trading industry. The comparison indicates that the electronics/electric industry has greater IT application in the e-business environment.

From the survey, we find that IT strategy (product and marketing innovation strategy, manufacturing innovation strategy and operation efficiency improvement strategy) has no significant correspondence with either supplier or buyer. However, "manufacturing innovation strategy" is significantly correspondent to "supplier performance". For the partnership, Table 3 and Table 4 illustrate the significant effect between performance and buyer/supplier partnership for different degrees of e-business application.

5. Conclusions and Suggestions

Surveying IT application degree, partnership and the performance, we conclude as follows:

(1) The correspondence analysis indicates that "IT

application degree" has positive correspondence with "supplier partnership" and "buyer partnership", which also means that "IT application degree" has positive correspondence with "supplier involvement" and "content of information exchange". Furthermore, "IT application degree" and "partnership" have positive correspondence with "e-business performance", namely, either supplier or buyer partnership will have positive correspondence with e-business performance.

- (2) "High degree of IT application" has stronger impact on supplier partnership than on buyer partnership, whereas "Low degree of IT application" affects buyer partnership more than supplier partnership. Supplier performance and buyer performance also have the same trend.
- (3) The impact of supplier partnership, supplier involvement and information exchange on the performance of e-business is affected by the degree of commitment to IT. A higher degree of commitment indicates better performance. Different IT portfolios will also affect the performance of the e-supply chain.

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