行政院國家科學委員會專題研究計畫 成果報告

從台灣企業與中國大陸供應商關係特性分析資訊系統移轉大陸之成功因素
研究成果報告(精簡版)

計 畫 類 別 ：個別型
計 畫 編 號 ：NSC 97-2410-H-004-127-
執 行 期 間 ：97 年 08 月 01 日至 98 年 07 月 31 日
執 行 單 位 ：國立政治大學資訊管理學系

計 畫 主 持 人：張欣綠

計畫參與人員：碩士班研究生-兼任助理人員：李盈儒
碩士班研究生-兼任助理人員：張至善
碩士班研究生-兼任助理人員：馮秉義

報 告 附 件 ：出席國際會議研究心得報告及發表論文

處 理 方 式 ：本計畫可公開查詢

中 華 民 國 98 年 09 月 09 日

行政院國家科學委員會補助專題研究計畫 ■ 成 果 報 告
□期中進度報告

從台灣企業與中國大陸供應商關係特性分析資訊系統移轉大陸之成功因素

計畫類別：■ 個別型計畫　　□ 整合型計畫

計畫編號：NSC 97-2410-H-004-127-

執行期間：　2008　年 08 月 01 日至 2009 年 07 月 31 日

計畫主持人：張欣綠

共同主持人：無

計畫參與人員：張至善，李盈儒，馮秉義

成果報告類型(依經費核定清單規定繳交)：■精簡報告　□完整報告

本成果報告包括以下應繳交之附件：

□赴國外出差或研習心得報告一份

□赴大陸地區出差或研習心得報告一份

■出席國際學術會議心得報告及發表之論文各一份

□國際合作研究計畫國外研究報告書一份

處理方式：除產學合作研究計畫、提升產業技術及人才培育研究計畫、列管計畫及下列情形者外，得立即公開查詢

□涉及專利或其他智慧財產權，□一年□二年後可公開查詢

執行單位：國立政治大學資訊管理學系 張欣綠

中　華　民　國　2009　年 9　月 9　日

（一) 中、英文摘要及關鍵詞(keywords)

Abstract

As corporations rely more on collaboration with partners to enhance their position in the global business environment, many of them apply specific inter-organizational systems (IOS) as a powerful tool to link with their trading partners to take full advantage of collaboration. China with huge manufacturing base and great market potential has played an important part of global supply chains. In order to understand how to successfully implement IOS with Chinese supply chain partners, we aim to find out the key relational antecedents of IOS performance in China through an observation of a binary relationship built upon an e-procurement system between a Taiwanese ODM (Original Device Manufacturer) and its Chinese suppliers. Based on the relational view of the firm, four relational antecedents are proposed and examined. The results show that effective governance most strongly affects IOS performance in China, whereas complementary resource endowment has least influence.

Keywords：Relational view, Inter-organizational systems, China, Supply ChainCollaboration, IT transfer

摘要

中國廣大的市場機會及低廉的土地及勞工成本吸引了許多跨國企業將其生產線外移到大陸，台灣也不例外。緊隨著生產外移即是資訊系統的移轉，然而許多的台灣企業卻面臨資訊系統移轉的困難。換言之，一個在台灣廣泛被企業供應鏈所接受的跨組織資訊系統，在推廣到中國大陸的供應鏈時，卻沒有達到與台灣相同的系統成效。過往的文獻在討論資訊系統移轉中國大陸的困難時，總提到技術及文化上的差異，但是專門針對供應商關係差異的文獻討論卻很少。然而當系統使用者由台灣供應商轉變為中國大陸供應商時，台灣企業與這些中國大陸供應商的關係應會直接影響到系統移轉的成敗。因此本研究採用策略理論中關係觀點，從台灣企業與中國大陸供應商關係特性分析資訊系統移轉大陸之成功因素。本研究討論四個相關跨組織資訊系統的關係資產及其對跨組織資訊系統移轉成功的影響：(1) 雙方對系統的投資，(2) 雙方知識分享活動，(3) 雙方策略及組織互補性，(4) 雙方交易控管機制。我們會以個案研究的方式，進行理論的建置與證明。研究成果顯示，雙方交易控管機制對跨組織系統移轉之影響最大; 反之，策略及組織互補性的影響最小。本研究成果的貢獻有二：(1) 幫助台灣企業了解跨組織資訊系統移轉中國大陸的成功關鍵因素，(2) 了解中國大陸供應商系統使用需求，及兩岸使用者的差異，進而幫助台灣企業建置符合中國大陸使用者需求的跨組織資訊系統。

關鍵字：關係觀點，跨組織資訊系統，中國大陸，供應鏈合作，資訊系統移轉

(二)報告內容

1. Introduction

Due to Chinese huge market potentiality, profuse production resource in workforce and land, and low production costs, many international giant companies are moving their production line to China. Along with the production offshoring is information systems transfer. However, our field study indicates that many Taiwanese companies failed in transferring their inter-organizational systems (IOS) to China. While many technological barriers such as the diversity of technology development among provinces and slow growing rate of networks are generally discussed in recent literature (Tan and Ouyang, 2004), the barriers related with IOS-embedded inter-organizational partnerships in the context of China are seldom discussed. Drawn upon the relational view of the firm (Dyer and Singh, 1998), we identify IOS related investments in: (1) IOS-specific assets, (2) inter-firm knowledge-sharing routines, (3) system complementarity and compatibility, and (4) effective IOS governance as four relational antecedents of IOS performance in China. We focus our theory building and theory testing with an observation of an IOS-embedded relationship built by a Taiwanese PC ODM and its Chinese suppliers. We try to answer the following two questions: (1) how can corporations guarantee the IOS performance once they transfer the IOS to China and (2) what are the important relational determinants of IOS success in the context of China?

2. Conceptual Background

The basic concepts of relational view of the firm will first be introduced, and then related research in the IS field will be examined. At last, the application of relational view in the context of China will be described.

2.1 The Relational View

While the industry structure view (Porter 1980) suggests that supernormal returns are primarily a function of a firm's membership in an industry with favorable structural characteristics, the resource-based view (RBV) of the firm argues that differential firm performance is fundamentally due to firm heterogeneity rather than industry structure (Barney, 1991; Rumelt, 1984; Wernerfelt, 1984). According to Dyer and Singh (1998), a firm's critical resources and capabilities may extend beyond organizational boundaries and may be embedded in inter-firm resources and processes. They defined four resources that can generate relational rents:

(1) Interfirm Relation-Specific Assets: A firm may gain advantages by creating assets conjunction with the assets of the trading partners (Klein et al. 1978, Teece 1987, Perry 1989, Williamson 1985, Dyer and Singh 1998). Subramani and Venkatraman (2003) classified such assets into two dimensions: tangible assets specificity and intangible assets specificity. The former includes site specificity and physical asset specificity, and the latter can be conceptualized in terms of business process specificity and domain knowledge specificity.

(2) Inter-firm Knowledge-Sharing Routines: An inter-firm knowledge-sharing routine is a regular pattern of inter-firm interactions that permits the transfer, recombination, or creation of specialized knowledge (Grant 1996, Dyer and Singh 1998). These are institutionalized inter-firm processes designed to facilitate knowledge exchange between partners.

(3) Complementary Resource Endowments: Complementary resource endowments are distinctive resources of trading partners that collectively generate greater rents than the sum of those obtained from the individual endowments of each partner. These complementary strategic resources increase with the degree of compatibility in their organizational systems, processes, and cultures. (Dyer and Singh 1998).

(4) Effective Governance: Governance plays a key role in the creation of relational rents because it influences transaction costs, as well as the willingness of alliance partners to engage in value-creation initiatives (Williamson, 1985, North, 1990, Dyer and Singh, 1998). Three

governance mechanisms are suggested (Kim and Umanath, 2005): Coordination of decision and operation integration, information sharing, and monitoring and control.

2.2 IOS-embedded relations

Multiple IS literature have recognized that interfirm relation-specific assets as critical sources to promote qualitative IOS-embedded relations. For example, Subramani (2004) found that relationship-specific investments in business processes and domain knowledge can enhance a supplier's ability to keep the value generated by IT use. Similarly, Son et al. (2005) indicated that the greater the reciprocal investments provided by the customer, the greater the volume the diversity of EDI usage in the customer-supplier relationship. Patnyakuni et al (2006) suggested that tangible and intangible specific assets invested in supply chain partnerships enable information flow integration between a focal firm and its' partners for supply chain coordination. In addition to relation-specific assets, inter-firm knowledge sharing routines are often mentioned in past IS literature. According to Wang et al (2006), knowledge sharing routines between buyers and suppliers are critical in dealing with process-oriented problems. Patnyakuni et al (2006) investigated the significance of knowledge sharing routines across the supply chain and found that such routines can support information flow integration for coordination between a focal firm and its supply chain partners.

Complimentary IOS resources were first examined by Bensaou (1997). He argued that compatibility in goals and technological capabilities reduce the uncertainty about the partner's inclination and potential intentions for opportunistic behavior and therefore invite cooperation. Following that, Tan and Raman (2002) found that strong complementarity, which is meant to both the focal firm and its supply chain partners have adequate IT sophistication and financial resources to jointly undertake the IOS implementation, has positive impact on IOS adoption. The relation-specific IT governance was examined in a recent study by Kim and Umanath (2005). They identified four governance mechanisms: (1) decision and operation integration, (2) mutual investment in relationship-specific assets, (3) information sharing, (4) monitoring and control. The first one can reduce the coordination costs, and the remainders can diminish the costs of managing transaction risks.

2.3 IOS Adoption in China

The majority of past IOS research conducted in China focused on general issues of e-business/e-commerce adoption at the country level (e.g., Hsieh 2006, Tan and Ouyang 2004, Wang 2002). Some other researchers noticed a particular type of buyer-supplier relationships in China called guanxi, a system of personal connections that carry long-term social obligations, and explored its impact on IOS performance. In this research, we focus on the relational antecedents of Chinese IOS adoption based upon relational view of the firm. The examination of four relational antecedents in the context of China is as follows:

Inter-firm relation-specific assets. In China, such asset specificity is often shown in the form of joint IOS development teams and inter-organizational business process re-engineering (BPR). According to a case study of Cisco and Xiao Tong in China by Lu et al. (2006), the implementation team for IOS consisted of three parties, i.e. Xiao Tong, Cisco and the third-party implementation vendor. There were four sub-teams built namely the management team, the business team, the technical team and the partner team. In order to obtain mutual benefits from IOS, each party was encaged in setting up the implementation team to solve problems actively. At the mean time, inter-organization BPR was conducted to ensure the smooth operation of IOS. The BPR included two parts. The first one was the adjustment of processes. Non-value-added parts of business processes were erased after the implementation of IOS. The second part was mainly about formulating the new form of cooperation between Cisco China and Xiao Tong.

Inter-firm knowledge sharing routines. Firms must have the ability to explain what knowledge shared by trading partner exactly means, or to know by where, by whom they can access related

useful information to solve IOS problems. Such partner absorptive capability is critical to the success of knowledge sharing between firms. According to Luo (1997), the absorptive capacity of local firms in China is important for the international joint venture's overall performance and its financial returns. Such capacity can be defined as the local firm's ability to acquire, assimilate, and integrate the foreign partner's distinguishing technologies or tacit knowledge. Similarly, Hitt et al. (2004) found that unique capabilities are more difficult to learn than complementary capabilities in China because of their exclusivity and a lack of absorptive capacity of partnering firms.

Complementary resource Endowments. According to Hitt et al. (2004), although of more importance to Chinese managers is the opportunity to learn new and unique capabilities, Chinese firms still desire partners with complementary capabilities that they can leverage. They will select partners with capabilities that are complementary to their own contributes to achieve growth and efficiency goals. Also, Luo (1997) argued that selection of complementary partners will result in improved international joint venture performance.

Effective governance. Shin et al. (2007) mentioned that effective governance is especially important in China due to the existence of "guanxi," the special feature of Chinese buyer-supplier relationships. A good design of governance mechanisms can promote information sharing upon Chinese 'guanxi' network and enormous opportunities for improved efficiency, increased flexibility, and timeliness can be realized.

3. Research Framework

The research framework to study the relational antecedents of IOS performance is shown in Figure 1. Each construct and its subcomponents are described below.

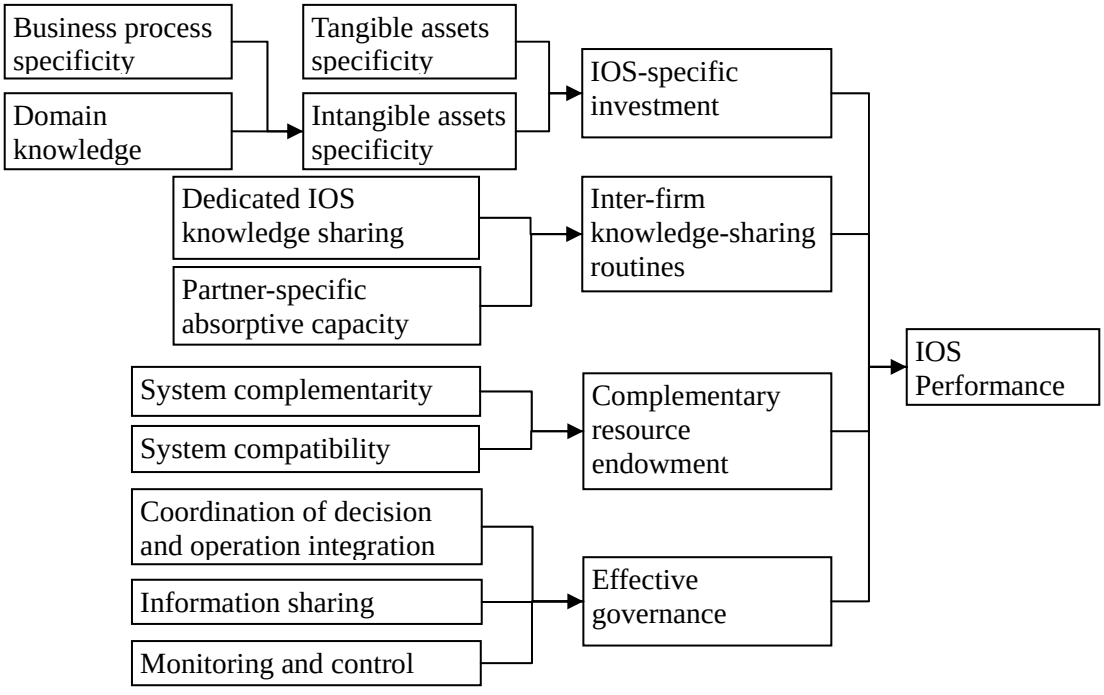

Figure 1. Research Framework

IOS-specific investment refers to the assets that are specialized in conjunction with the assets of an IOS partner. It is classified into two types: tangible assets specificity and intangible assets specificity. Tangible assets are defined as specialized hardware/software or dedicated people that are advantageous in working with a specific IOS partner (Dyer and Singh 1998, Subramani and

Venkatraman 2003). Intangible assets specificity can be further divided into business process specificity and domain knowledge specificity (Subramani and Venkatraman 2003). Business process specificity refers to the degree to which critical business processes are changed by one firm to meet the requirements of an IOS. Domain knowledge specificity refers to the degree to which critical knowledge of a firm is specific to the requirements of an IOS. The critical knowledge includes the understanding of partners, like partner's competitive analysis, strategy formulation, products conception, and so on.

Inter-firm knowledge sharing routines are defined as regular patterns of inter-firm interactions that permit the transfer, recombination, or creation of specialized knowledge specifically about the IOS (Patnayakuni 2006). There are two key components of inter-firm knowledge-sharing routines: dedicated IOS knowledge sharing activities and partner-specific absorptive capacity. Dedicated IOS knowledge sharing activities are those that make firms successful in capturing, integrating, and disseminating IOS-management know-how such as technology forums, workshops, and seminars (Dyer et al. 2001). Partner-specific absorptive capacity refers to the ability to recognize and assimilate valuable knowledge about the IOS from a particular partner (Dyer 1998).

Complementary resource endowment refers to the distinctive resources of IOS partners that collectively generate greater advantages than the sum of those obtained from the individual endowments. Through combination of these resources within partners will make the IOS more powerful and more competitive, and hard to imitate. In this study, complementary resource endowment is divided into two components: system complementarity and system compatibility. Complementary systems are those that are owned by partners and are valuable, rare, and difficult to imitate when combined with the underlying IOS. For instance, Wal-Mart's point-of-sales (POS) application is a complementary system with regard to P&G's collaborative planning, fulfillment, and replenishment system (CPFR), because when Wal-Mart's sales information conjuncts with supplier's production information, both parties can adjust their production arrangement or stock level immediately and achieve superior competitive advantage that neither system can generate alone. Besides system complementarity, system compatibility is also important to the IOS success. We define system compatibility as the situation in which the internal applications are compatible enough to facilitate coordinated IOS operations.

Using IOS to transact with trading partners may expose firms to a great risk of opportunism or losing its important information. It is important to choose a governance structure that minimizes transaction costs and transactions risks (e.g. opportunistic behavior or information asymmetry). Three governance mechanisms are suggested by the past literature (Kim and Umanath, 2005): Coordination of decision and operation integration, information sharing, and monitoring and control. Coordination of decision and operation integration refers to the ability to integrate decisions and operations among economic activities that occur between partners. Information sharing refers to the ability of firms to freely share information relevant to the relationship, e.g. exchange of production/sales data, sharing promotion plans, etc. Monitoring and control refers to

the ability to monitor and control the partners' operation information (such as production schedule, or inventory levels, etc), performance, and the transactions status.

4. Research Methodology

4.1 Case Study

Company A is chosen to test our proposed framework. Company A is among the top three Taiwanese ODMs (Original Device Manufacturer) which produces notebooks, LCD monitors, PDAs and phones in Taiwan IT industry. It was established in early 80's. Head office was set in Taipei with two factories in China. Total annual revenue reached more than NT 7,000 billion dollars with worldwide workforce over 20,000 in 2005. In recent years, company A moved its production line to China due to the profuse production resources and low production costs. With its production shifting to China, company A also tried to transfer its information systems to China. In 2004, over 500 Chinese suppliers of company A started to use an e-procurement system to receive orders. While this system had been well used with Taiwanese suppliers, the performance of this system in China was relatively unsatisfactory in terms of grant complaints from Chinese users.

4.2 Data Collection

Since this study tries to examine the relational antecedents that may affect the performance of an E-procurement system (IOS) between one major buyer (i.e. company A) and its Chinese suppliers, data were collected from a series of interviews of internal and external users. Internal users include seven executives and managers of information department and procurement department and purchasing agents in company A (shown in Table 1). External users include sales agents of five component supplier companies (Firm 1, 2, 3, 4, 5) and of two hub companies (Firm 6 and 7) in China (shown in Table 2).

Table 1. Description of the interviewees of company A

Buyers	Department	Title
1	Information department	Manager
2	Resource department	Deputy section manager
3	Resource department	Agent
4	Resource department	Agent
5	Procurement department	Purchasing agent
6	Procurement department	Purchasing agent
7	Procurement department	Purchasing agent

Table 2. Description of the interviewed suppliers/hubs

Suppliers /Hubs	Main Products to Company A	Capital (NT$ billions)	Employees	Location
1	Front/Back cover of NB	4.14	25,100	Suzhou, China
2	Resistor,Capacitor,Antenna	31.7	7,000	Kunshan, China
3	Label	0.49	240	Kunshan, China

4	MB, Cable, Connector	57	130,000	Kunshan, China
5	PCB	5.28	3000	Suzhou, China
6	Hub service	1	450	Kunshan, China
7	Hub service	0.33	250	Kunshan, China

All interviews were tape recorded and then transcribed into manuscripts before analysis. Also, the information collected was arranged into tables to help interpret the IOS usage. Then the IOS use was analyzed in terms of how it would match the identified items in our proposed framework. This allowed several evidences from interview records to be identified associated with the four factors we proposed. An example of how cases were analyzed with the proposed framework is presented in Table 3.

Table 3. An analysis example of the case study: Analyzing the construct "IOS-specific Investment"

Factor	Item	Concept	Evidence	Example
IOS-specific Investment	Tangible assets specificity	Specific tangible assets for IOS	■ IOS-related IT investment ■ Dedicated human resource for IOS development	■ Internet equipment is insufficient to support IOS ■ Dedicated IOS team is formed for supporting IOS adoption.
	Business process specificity	Specific business process for IOS	Process change to fit the needs of IOS	■ The procurement process does not fully fit for IOS and needs some adjustments.
	Domain knowledge specificity	Specific knowledge about partner	Knowledge required for working with partners	■ We need to know about the focal firm's new product concepts and future plans.

5. Case Analysis

5.1 Overall Assessment

Appendix A shows the frequencies of the presence of proposed factor items over all interview records where each item had at least one observation. The data are organized into two dimensions: suppliers and buyers. We can observe the following results: (1) items related to IOS-specific investment factor were identified 52 times, (2) items related to inter-firm knowledge-sharing factor were identified 76 times, (3) items related to complementary resource endowment factor were mentioned 6 times, and (4) items related to effective governance factor were mentioned 207 times. The total number of items recognized in 15 interview records was 341 times. Each factor's relative frequencies from the total numbers of identified items are shown as follows:

- IOS-specific investment factor: 15.2%
- Inter-firm knowledge-sharing factor: 22.3%
- Complementary resource endowment factor: 1.8%
- Effective governance factor: 60.7%

The result shows that effective governance factor-related items seem to play the most important role to influence IOS performance. On the contrary, complementary resource endowment factor-related items almost have the least effect on IOS performance. Of all the items, coordination of decision and operation integration and monitoring and control are the two most important factors to affect firm performance (as shown in Figure 2).

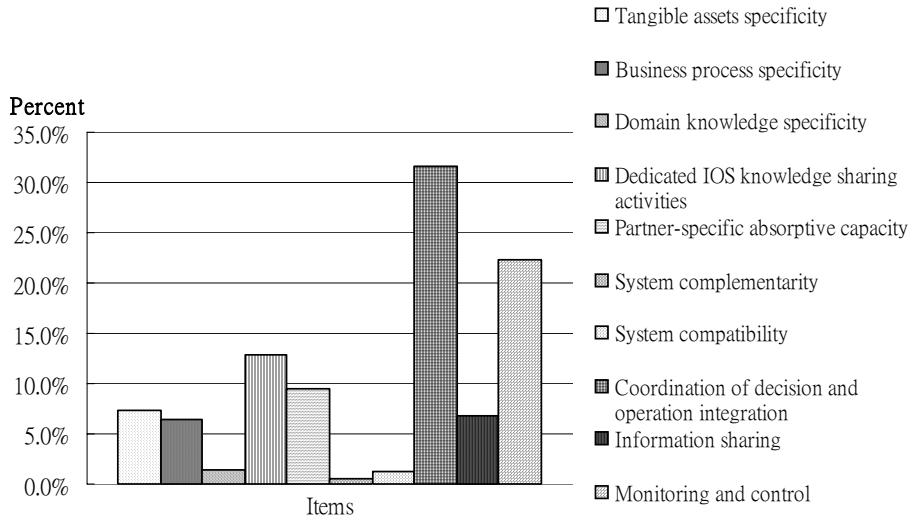

Figure 2. Relative frequencies of research items.

5.2 From the Perspectives of Buyers/Suppliers

For buyers, the most often mentioned factors are inter-firm knowledge-sharing (36.7%) and effective governance (38%). Interestingly, the item "system compatibility" has never been identified by buyers. For suppliers, the most often mentioned factor is effective governance (82.3%). The frequency of all the other three factors is less than 10%. Then we classified the suppliers into three types based on the products they supplied to the buyer: key-part suppliers, non-key-part suppliers, and hubs. It is interesting to find that hub suppliers obviously placed less attention on the proposed relational antecedents (the total items they identified are 11 compared with key part suppliers' 93 and non-key part suppliers' 71). Although both key part and non-key part suppliers identified most items in effective governance, they emphasized different governance mechanism. Key part suppliers concern "monitoring and control" the most, while non-key part suppliers put more focus on "coordination of decision and operation integration."

6. Findings and Discussion

We derive three findings from the above analysis and discuss them below.

Finding 1: While suppliers perceive effective governance as the most significant relational antecedent of IOS performance, buyers consider knowledge sharing as equally important as effective governance.

The results show effective governance and knowledge sharing routines are both important relational antecedents of IOS performance in buyer perspective. But in supplier perspective, effective governance is apparently more important to IOS performance than other three factors. The fact that governance factors are especially significant to suppliers may result from suppliers' weak market power in China. In this case, suppliers are forced to adopt the IOS provided by company A. They do not have choices if they want to make business with company A. So the motivation of suppliers to maintain good IOS relationship is relatively weaker than that of buyers.

In the condition that suppliers are not perfectly happy to adopt the IOS, they only concern how well the system can support the decision making and operation. This finding supports Lu's (2006) assertion that IOS success in China depends on whether the organization can derive benefits from the system, co-operate with its trading partners and perceive their business relationship as interdependence. Further, suppliers may perceive more benefits if the IOS allows them to monitor and control the status of transactions and track buyers' payments. Losing such system capability is thus considered as a risky implementation from supplier perspective. This result is similar with Kim and Umanath's (2005) argument that the transaction risk in cooperative relationship can be bidirectional. That is, suppliers may also feel strongly unsecured if the system does not provide any function to prevent buyers' opportunistic behaviors. Therefore, our finding suggests that a better governance mechanism design that guarantees the fair transaction between buyers and suppliers is an important relational antecedent of IOS performance from the view of suppliers.

While suppliers put much emphasis on effective governance, they didn't emphasize inter-firm knowledge sharing as much as buyers did. Such contradiction highlights the fact that Chinese suppliers generally lack absorptive capacity. In this case, although company A did conduct many IOS knowledge sharing activities such as training and seminars, suppliers obviously did not appreciate much. Instead, suppliers cared more about how much benefit the IOS can bring them. It may be either because suppliers already have sufficient knowledge or they didn't know how important it is. In China, the later is most possible as most Chinese buyers reflect that the performance of supplier learning is far behind their expectation. This finding somehow supports Hitt et al (2004)'s observation about the lack of absorptive capacity of partnering firms in China. On the other hand, it also reminds buyers to encourage effective knowledge sharing with their Chinese suppliers.

Finding 2: Different suppliers may have different consideration of IOS relationships. Hub suppliers perceive few relational antecedents of IOS performance, while key part suppliers perceive monitoring and control as the most significant antecedent and non-key part suppliers perceive the coordination of decision and operation integration as the most significant one.

As the results show, different type of suppliers might have different concerns about IOS relationships. Hub suppliers obviously didn't view relational factors as important IOS performance drivers. It may be because hub suppliers do not involve in transactions as deeply as other types of suppliers. They only provide goods keeping services, and therefore the e-procurement system is not embedded deeply in their buyer-supplier relationship. For key part suppliers, monitoring and control is the most important relational antecedent. It could be explained by the fact that the products they provide are more expansive than other kinds of suppliers. Once a transaction is cancelled or not accomplished as deal, the damage will be greater. So they concern more about the ability of monitoring and control of transactions. For non-key part suppliers, coordination of decision and operation integration is the most important antecedent. Since the products provided by non-key part suppliers are mostly standardized, the demands for such products are volatile. Suppliers in such circumstances need to be agile enough to handle external disruptions smoothly. According to Porter (2001), the competitive advantage for these suppliers depends on the provision of the same products but in a more efficient manner and, therefore, an well-integrated decision and operation which can reduce the coordination costs and speed up the procurement processes becomes preferable.

Finding 3:Regardless of supply chain player roles, effective governance is the most important factor and complementary resource endowment is the least important relational antecedent to IOS performance.

Regardless of the roles of supply chain players, there is a common result – effective governance is the most frequently mentioned relational antecedent of IOS performance in China. On the other hand, complementary resource endowment factor has extremely little effect on IOS performance

in this case. Perhaps it is because the complementary resource endowment is a relatively more strategic consideration that are less considered by Chinese supply chain players while they spent most of time dealing with operation issues. The result may suggest that Chinese players should extend their current operation-oriented IOS development to a more strategic level.

7. Conclusion

The proposed framework discussed four potential relational antecedents that may contribute Chinese IOS performance: (1) IOS-specific investment factor, (2) inter-firm knowledge-sharing, (3) complementary resource endowment, and (4) effective governance. Company A, a major Taiwanese PC ODM, is chosen to test the proposed framework. Through the case study, we find effective governance factor is identified as the most important relational antecedent of IOS performance in China whereas complementary resource endowment factor has least effect on IOS performance. Moreover, different supply chain players might have different concern about IOS relationships. Suppliers concern more about effective governance factors than buyers do. Key part suppliers view the ability of monitoring and control as the most important relational element while non-key parts suppliers concern more about whether the underlying IOS can facilitate the transaction to reach coordination of decision and operation integration. It is also interesting to note that hub suppliers have little interest on any proposed relational antecedent. While these research findings can give companies some guidelines for building IOS relationship with trading partners, further investigation of the proposed framework in other case is a possible future extension to enhance the research findings' generality.

References

1. Barney, J. "Firm Resources and Sustained Competitive Advantage," *Journal of Management* (17:1) 1991, pp. 99-120.
2. Bensaou, M., "Interorganizational cooperation: The Role of Information Technology: An Empirical Comparison of U.S. and Japanese Supplier Relations. *Information Systems Research*, 1997, Vol. 8, No. 2, pp. 107-124
3. Dyer, J.H. and Singh, J.,"The Relational View :Cooperative Strategy and Source of Interorganization¬al Competitive Advantage," *Academy of Management Review*, 1998, Vol. 23, No. 4, pp. 660-679.
4. Dyer, J.H. and Nobeoka, K., "Creating and Managing a High Performance Knowledge-Sharing Network: The TOYOTA Case," *Strategic Management Journal*, 2000, Vol. 21, pp. 345-367.
5. Dyer, J.H., Kale, P. and Singh, H., "How to make strategic alliances work," *MIT Sloan Management Review*; Summer 2001, Vol. 42, No. 4, ABI/INFORM Global pp. 37.
6. Grant, R., "Prospering in dynamically-competitive environments: Organizational capability as know- ledge integration," *Organization Science* Vol.7, 1996, pp 375-387.
7. Hitt, A.M., Ahlstorm, D., Dacin, M.T., Levitas, E., Svobodina, L., "The Institutional Effects on Strategic Alliance Partner Selection in Transition Economies: China vs. Russia," *Organization Science*, March-April 2004, Vol. 12, No. 2, pp. 173-185.
8. Hsieh, C.T., Lai, F. and Shi, W., "Information orientation and its impacts on information asymmetry and e-business adoption: Evidence from China's international trading industry," *Industrial Management & Data Systems*, Vol. 106, No. 6, 2006 pp. 825-840.
9. Kim, K.K., and Umanath, N.S., "An empirical investigation of electronic integration in supply channel relationship," In P. De and J.I. DeGross (eds.), *Proceedings of the Twentieth International Conference on Information Systems*. Atlanta: Association for Information Systems, 1999, pp. 546–551.
10. Kim, K.K., and Umanath, N.S., "Information Transfer in B2B Procurement: An Empirical Analysis and Measurement," *Information & Management*, 2005, Vol. 42, pp.813-828.

11. Klein, B., Crawford, R. G., and Alchian, A. A., “Vertical integration, appropriable rents, and the com -petitive contracting process,” *Journal of Law and Economics* (21) 1978, pp 297-326.
12. Lu, X.H., Huang, L.H., Heng, S.H., “Critical success factors of inter-organization information sys- tems—A case study of Cisco and Xiao Tong in China,” *Information & Management*, 2006, Vol. 43, pp. 395-408.
13. Luo, Y., “Partner Selection and Venturing Success: The Case of Joint Ventures with Firms in the People’s Republic of China,” *Organization Science*, November-December 1997, Vol. 8, No. 6.
14. North, D.C. *Institutions, institutional change and economic performance*, Cambridge, England: Cam- bridge University Press, 1990.
15. Patnayakuni, R., Rai, A., and Seth, N., “Relational Antecedents of Information Flow Integration for Supply Chain Coordination,” *Journal of Management Information Systems*, 2006, Vol. 23, No. 1, pp. 13-49
16. Perry, M.K. "Vertical integration," in: *Handbook of industrial organization*, I.R.S.R.W. (Eds.) (ed.), Amsterdam: North Holland, 1989, pp. 185-255.
17. Porter, M. E., *Competitive Strategy*, New York: Free Press, 1980.
18. Porter, M. Strategy and the New Economics of Information, *Harvard Business Review*, March, 2001, pp.63-78.
19. Rumelt, R. P. “Toward a Strategic Theory of The Firm. In R.B. Lamb (Ed.),” *Competitive Strategic Management*, 1984, 556-571, Englewood Cliffs, NJ: Prentice-Hall.
20. Shin, S.K., Ishman, M. and Sanders, G., “An empirical investigation of socio-cultural factors of information sharing in China,” *Information & Management*, 2007, Vol. 44, pp. 165-174.
21. Subramani, M. and Venkatrman, N., “Safegarding Investments in Asymmetric Interorganization Rela- tionships : Theory and Evidence,” *Academy of Management Journal*, 2003, Vol. 46, No. 1, 46-62
22. Subramani, M., “How Do Suppliers Benefit From Information Technology Use In Supply Chain Relationships?” *MIS Quarterly*, March 2004, Vol. 28, No. 1, pp.45-73.
23. Tan, Z. and Ouyang, W., “Diffusion and Impacts of The Internet and E-Commerce in China,” *Electronic Markets* (Special Selection: Globalization and Electronic Commerce), 2004, Vol.14, pp.25-35.
24. Teece, D.J. "Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy," in: *The competitive challenge: Strategies for industrial innovation and re- newal*, I.D.J.T. (Ed.) (ed.), Cambridge, MA: Ballinger, 1987, pp. 185-219.
25. Wang, T., *The 2001 Blue Book of E-Commerce in China*, Beijing: China Finance Press, 2001.
26. Wang, G.A., “On Obstacles to E-business Development in Mainland China,” *Quarterly Journal of Electronic Commerce*, 2002, Vol. 3, No.4, pp. 417-427
27. Wang, T.G., Tai, C.F., Wel, H.L., “A Virtual Integration Theory of Improved Supply-Chain Performan -ce,” *Journal of Management Systems*, Fall 2006, Vol. 23, No. 2, pp. 41-64.
28. Wernerfelt, B., “A Resource Based View of The Firm,” *Strategy Management Journal*, 1984, 5: 171 -180
29. Williamson, O.E. *The economic institutions of capitalism*. New York: Free Press, 1985.

(三)計畫成果自評

本研究之主要發現彙整如下：

（一）本研究從供應商關係的角度探討四個可能會影響跨組織系統移轉大陸的因素：(1) 雙方對系統的投資，(2) 雙方知識分享活動，(3) 雙方策略及組織互補性，(4) 雙方交易控管機制。研究結果顯示成功因素有四：

甲、 除了雙方系統投資之外，流程的改造亦同等重要，而流程改造需從詳細定義雙方交易活動輸入及產出為開始。

乙、 台灣公司需要提供大陸供應商完整的訓練課程及系統操作使用手冊，並且指派特定團隊負責系統移轉相關事務，包含問題的諮詢及解決。

丙、 供應商是否能夠感受到新系統的效用對移轉成功至關重要。通常，若新系統能夠跟某些原有系統在功能上互補，供應商有較高的意願去接受。

丁、 一個有效的控管機制是很重要的。這個控管機制必須能提供大陸供應商足夠的動機去遵守系統的需要，監控資料的使用，確保資料的正確，及確保資料從兩端送出皆能及時且正確無誤的被對方收到。

（二）本研究亦顯示資訊系統的控管機制(IOS Governance)對移轉成功的影響最大，其次為雙方的投資，在其次為知識分享，最後為系統互補性。我們並發現大陸採購最強調雙方投資的影響力，大陸供應商最重視資訊系統控管，而台灣母公司則最常提到知識分享及系統互補。

本計畫之研究成果豐碩。在過去一年中，階段性之研究成果已有兩篇國際會議論文(*the 7th Workshop on e-Business; Pacific-Asia Conference on Information Systems 2009*), 兩篇 SSCI 的期刊論文（International Journal of Electronic Commerce, Journal of Organizational Computing and Electronic Commerce)。亦有一篇論文投稿至國際期刊 Information & Management，目前正在審查中。

出席國際學術會議心得報告

計畫編號	NSC 97-2410-H-004-127-
計畫名稱	從台灣企業與中國大陸供應商關係特性分析資訊系統移轉大陸之成功因素
出國人員姓名 服務機關及職稱	張欣綠，國立政治大學資訊管理學系助理教授
會議時間地點	Hyderabad, India
會議名稱	中文：2009 亞太資訊系統年會 英文：2009 Asia-Pacific Conference on Information Systems (PACIS)
發表論文題目	Assessing IT-business alignment in service-oriented enterprises

壹、 參加會議經過

由於開會所在地為印度，是 H1N1 黃色警戒區，因此本人雖繳交註冊費，但是最終並未成行。由於論文已被大會接受，故本人委託長庚大學資管系助理教授黃麗婷在會中代為發表論文，並僅花費原核定經費中註冊費一項。茲附上被接受論文如下：

貳、 發表論文

ASSESSING IT-BUSINESS ALIGNMENT IN SERVICE-ORIENTED ENTERPRISES

Chang, Hsin-Lu, National Chengchi University , No.64, Sec. 2, Jhihnan Rd., Wunshan District, Taipei City 116, Taiwan (R.O.C.), hchang@mis.nccu.edu.tw

Hsiao, Hsiang-En, E-Cyberlink Department , CyberLink Corp., Minchiuan Rd., Shindian City, Taipei 231, Taiwan (R.O.C.), kk_hsiao@cyberlink.com

Lee, Ying-Ju, National Chengchi University , No.64, Sec. 2, Jhihnan Rd., Wunshan District, Taipei City 116, Taiwan (R.O.C.), 96356035@nccu.edu.tw

Chang, Jeff, National Chengchi University , No.64, Sec. 2, Jhihnan Rd., Wunshan District, Taipei City 116, Taiwan (R.O.C.), 96356012 @nccu.edu.tw

Abstract

Nowadays more and more enterprises transform into service orientation to sustain their competitive advantage. In order to ensure the underlying information technology (IT) can help the transformation effectively, we aim to develop an IT-business alignment framework to assess the quality of alignment in the context of service-oriented enterprises. Based upon past literature, we propose three components of IT-business alignment: strategic alignment, operational alignment, and social alignment and study their contribution to customer service quality under different service integration level. Our data is collected from web questionnaires. The total data set constitutes a representative sample of n=300. Among all returned questionnaires, 96 were found to be complete and usable; this represented a response rate of 32 percent. A multiple regression analysis is conducted and derives the following three research findings: (1) Strategic alignment plays the most significant role in improving customer service quality compared with other two alignment factors and it becomes particularly influential to customer service quality when the enterprise has weak service integration. (2) Operational alignment contributes to customer service quality for enterprises with strong service integration (3) Social alignment effectively helps enterprises improve customer service quality no matter their service integration is weak or strong.

Keywords: Customer service systems, IT-business alignment, Service-oriented enterprise, Service integration

INTRODUCTION

Nowadays, Information Technology (IT)-Business alignment plays an important role in a company, because when IT aligns with business operations and strategies, IT can anticipate what the business requires in the future and lay out a trajectory to meet those upcoming needs (Hu and Huang 2007). IT-Business alignment now is ranked as the top ten of perennial business IT issues (Luftman 2003).

In the internet age, IT becomes a critical resource for a company to compete around the global market. When a company has a good IT infrastructure, IT can influence or drive the company's competitive strategy. Huang and Hu (2007) have pointed out the effectiveness of IT goes well beyond software and hardware; even the best IT cannot work efficaciously for a company unless it is properly used in the right context at the appropriate time. This statement is similar with Luftman et al. (2003) that in the global market, business success depends on the harmony of business strategy, IT strategy, organizational structure and processes, and IT infrastructure and processes.

However, aligning IT with business strategy is not an easy task. According to a survey by CFO magazine in November 2003, 48 percent of CFOs reported poor alignment between IT and business needs. The challenges are even higher when more and more enterprises transform to service-oriented enterprises (SOE). For these enterprises how to use IT to support service orientation and ensure the alignment with customer service needs becomes an important research issue, which is seldom discussed in the past literature. Therefore, the study aims to provide an answer to the following questions:

1. What are the important issues that should be considered in the perspective of IT-Business alignment?
2. How can we make IT-business alignment effective in the context of service-oriented enterprises?

LITERATURE REVIEW

IT-Business Alignment

The term "IT alignment" is generally defined in reference as the alignment of an organization's IT resources with the objectives of its business unit (Moody 2003). There are three major goals to the research of IT-business alignment. The first identifies the requirements and strategies for achieving the alignment. Earl, Rockart and Ross (1996) propose that IT management must be knowledgeable about the strategic and tactical thinking of senior management to ensure that investments in IT are targeted at strategic priorities. It is also crucial that the importance of IT-business alignment is recognized by all members in the company. Similarly, Reich and Benbasat (2000) have mentioned that a high level of shared domain knowledge has a positive impact on IT-business alignment. Weiss, Thorogood and Clark (2006) propose that there are no quick fixes or easy solutions to IT-business alignment. Enterprises must enhance the three constructions of technology resource, business enabler, and strategic weapon before achieving IT-business alignment.

The second identifies components of alignment that are required in enterprises. Chan (2002) proposes two different types of alignment: strategic alignment and structural alignment. Strategic alignment focuses on the fit between the priorities and activities of the IS function and those of the business unit. Structural alignment examines the degree of structural fit between IS and the business, specifically in the areas of IS decision-making rights, reporting relationships, (de)centralization of IS services and infrastructure, and the deployment of IS personnel. The research finds that IS strategic alignment is more important than formal IS structural alignment. The author also emphasize the importance of IS structure flexibility.

The third identifies methods, techniques, and tools that can enhance IT-business alignment. For example, Huang and Hu (2007) suggest that the balanced scorecard is an appropriate tool to ensure that IT aligns with the whole company's strategic programs. They also point out numerous organizational, cultural, and political barriers that may inhibit alignment. Peak and Guynes (2003) suggest an IT alignment planning process to connect strategic and tactical business goals with IT strategies, resources, systems, and services.

In summary, alignment is not just a process, but a mindset of how IT can work for, and with, business all the time - in other words, a basic principle of interaction between IT and business. In doing so, alignment can aid stakeholders in developing a clearer understanding of the goals and objectives of the project at the outset and maximize the potential return on IT investment (Huang and Hu 2007).

Service Oriented Enterprises

The concept of 'service orientation' comes from market orientation in strategic management literature. According to Slater and Narver (1999), market orientation is an ideology that places the highest priority on the creation and maintenance of superior customer value, and that urges employees to develop and exploit market information. Market-driven enterprises are distinguished by a corporate ability to sense events and trends in their markets ahead of their competitors. They can anticipate more accurately the responses to actions designed to retain or attract customers, improve channel relations, or thwart competitors (Day 1994).

Therefore, we can expect service-oriented enterprise requires a flexible and robust IT infrastructure to model, assemble, integrate, and manage business processes and deliver cost-effective, modular and scalable service innovations that are customized to the enterprise's requirements, timetables and priorities. IBM has called such IT capability as service integration and defined a seven-level Service Integration Maturity Model (SIMM) based on the degree of service de-coupling and amount of flexibility achievable. The seven levels of SIMM are described below.

Level 1: *Data Integration*. The organization starts from proprietary and ad-hoc integration, rendering the architecture brittle in the face of change.

Level 2: *Application Integration*. The organization moves toward some form of EAI (Enterprise Application Integration), albeit with proprietary connections and integration points.

Level 3: *Functional Integration*. The organization componentizes and modularizes major or critical parts of its application portfolio, exposing functionality in a more modular fashion. The integration between components is done through the interfaces and contracts between them.

Level 4: *Process Integration*. The organization embarks on the early phases of SOA by defining and exposing services for consumption internally or externally by business partners.

Level 5: *Supply-Chain Integration*. The organization extends its influence into the value chain and service eco-system. Services form a contract among suppliers, consumers, and brokers who can build their own eco-system for on-demand interaction.

Level 6: *Virtual Infrastructure*. The organization now creates a virtualized infrastructure to run applications after decoupling the application, its services, components, and flows. The infrastructure externalizes its monitoring, management, and events (common event infrastructure).

Level 7: *Eco-System Integration*. The organization now has a dynamically re-configurable software architecture. It can compose services at run-time using externalized policy descriptions, management, and monitoring.

In this research, we treat enterprises with strongly-matured service integration as those that have great potential to transform into service-oriented enterprises (SOE).

IT-Business Alignment in Service-oriented Enterprises

Besides proposing SIMM, IBM in 2004 has further elaborated service science discipline and highlighted three focuses of IT-business alignment in service-oriented enterprise: (1) strategic focus, (2) process focus, and (3) workforce focus. We discuss each in detail in the following paragraphs.

The strategic focus in SOE encounters big changes. In the past, companies create customer benefits and values by creating strong brand images. Most strategies are implemented in a short-term philosophy in which organizations respond to customers' expressed wants (Slater and Narver 1999). In contrast, the strategy for SOE is committed to understand both the expressed and latent needs of their customers (Slater and Narver 1999). To align with such strategic changes, IT development should be driven by corporate overall service strategy (Menor and Roth 2007).

The processes in SOE need to facilitate market learning and market response behaviours. To support this goal, the underlying IT should transform from independent, functional, and short-term IT planning (Weill, Subramani and Broadbent 2002) to enable companies to speed up the introduction of new services and products as well as identify and diagnose customer needs. The focus of IT is therefore on sharing information to leverage new service / products development processes and facilitating communication flow within the new service development project groups and the flow of information to people participating in the new service development process (Menor and Roth 2007). Ray, Barney and Muhanna (2004) have suggested that managers in the information systems unit must understand the business operations of the customer service unit and how to use IT to improve customer service. At the same time, managers in the customer service unit must recognize the potential of IT as a tool to increase the productivity (efficiency) of the customer service representatives and how to use IT to enhance customer service value.

At last, the structure of workforce is transformed from hierarchical arrangement to a horizontal, network-like structure based on service consumer-service provider relationships (Crawford et al. 2005). How to develop a service climate within work force becomes an important issue in SOE. Service climate is defined as employee perceptions of the practices, procedures, and behaviours that are expected, supported, and rewarded with regard to customer service and customer service quality (Schneider et al. 1998). To align with such service climate, IT needs to support customer service representatives for handling different situations that are likely to arise in the customer service function. It also needs to facilitate a working environment that encourages open communication and teamwork in the customer service unit and coordination between internal departments to provide quality customer service (Schneider, White and Paul 1998).

DEVELOPMENT OF RESEARCH FRAMEWORK

Our research framework is shown in Figure 1. We propose that IT-Business alignment in service-oriented enterprise should focus on the integration of three components in service science discipline: strategy, process, and workforce. Three types of IT-Business alignment are therefore examined in our research model: strategic alignment, operational alignment, and social alignment, which capture the strategic focus, process focus, and workforce focus of service science discipline respectively. Quality of customer service is the dependent variable, considering employee perceptions of the practices, procedures, and behaviors that are expected, supported, and rewarded with regard to customer service (Schneider et al. 1998). The hypotheses are described in detail in the following sections.

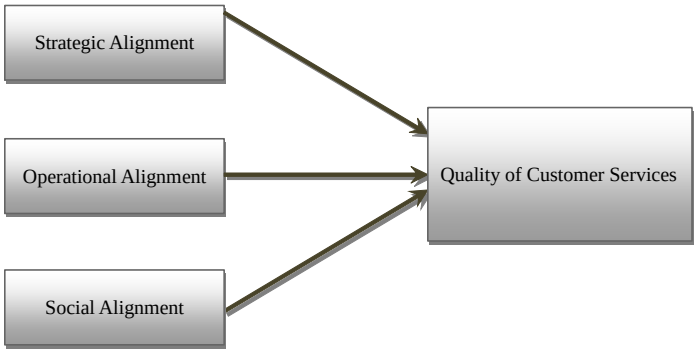

Figure 1. Research framework

Strategic alignment

Strategic alignment has been mentioned by Tallon and Kraemer (1999) as the extent to which the IS strategy supports, and is supported by the business strategy. Luftman (2003) considers strategic alignment is not a static state; it's a continuous maturing process over the long run. Huang and Hu (2007) further emphasize that strategic alignment should consider the integration between IT planning and business planning. Moreover, Oh and Pinsonneault (2007) posit that strategic alignment is the degree to which the priorities, goals, and objectives of the IS strategy are aligned with the priorities, goals, and objectives of the firm's business strategy. Maes et al. (2000) have suggested that the strategic alignment is the continuous process of consciously and coherently interrelating to all components of the business–IT relationship in order to contribute to the organization's performance over time. Built upon the previous research, we define strategic alignment in the context of service-oriented enterprises as the degree to which the business process and information can support corporate service strategies.

Since strategic alignment implies that any new service or product development is largely driven by overall business strategy (Menor and Roth 2007), we can expect enterprises with high strategic alignment are more able to design the product and services that better tailor customers' need. Furthermore, Peak and Guynes (2003) indicate that enterprises with high strategic alignment possess more qualitative information to support their market learning and market response behaviors, and thereby achieve better quality of customer services. The hypothesis is as follows:

Hypothesis 1*: There is a positive relationship between strategic alignment and quality of customer services.*

Operational alignment

Past literature has recognized the importance of IT alignment to business operations. Chan (2002) suggest that IS alignment should consider the integration of the IS function with the business unit structure. Moody (2003) has defined that IT alignment is the alignment of an organization's IT resources with the objectives of its business unit. Weiss et al. (2006) posit that IT alignment requires the integration and coordination of IT and business resource within organizational units. Based on above literatures, we define operational alignment in the context of service-oriented enterprise as the degree to which information systems fulfill the information and process needs of service orientation.

Since operational alignment can help identify and create new IT strategies and resources that can support IT systems to include the effects of competition (Rockart et al. 1996), enterprises are more able to design

standardized, readily accessible services that are easily consumable by other clients or applications to deliver timely customer services (Bieberstein et al. 2005). As a result, we can expect that an information system that can fulfill the needs of business processes and information is more able to deliver services that enhance the quality of customer services. The hypothesis is set forth:

Hypothesis 2*: There is a positive relationship between operational alignment and quality of customer services*

Social alignment

Reich and Benbasat (2000) have suggested that IT alignment should capture a social dimension in which business and IT executives share a common vision of the ways that in which IT will contribute to the success of the business unit. Following the reasoning, Huang and Hu (2007) define social alignment as the efforts of enterprises to maintain effective communication channels in order to institutionalize the culture of alignment. According to the previous studies, we define the social alignment in the context of service-oriented enterprises as the degree to which a common service climate is shared between IT and business units.

A good communications between IT and business managers and an effective channel for sharing domain knowledge with each group of people are critical factors to achieve social alignment (Reich and Benbasat 2000). According to Crawford et al. (2005), the structure of service-based enterprises is horizontal and network-like, and based on a consumer-service provider relationship. Such structure facilitates open communication and teamwork. Staff can freely exchange or share their information and knowledge, thereby increasing the potential to create innovative customer services and enhance the service quality (Schneider et al. 1998). So, we propose that the existence of a common service climate facilitated by formal communication channels can encourage knowledge sharing and therefore improve the quality of customer service. Here is the last hypothesis:

Hypothesis 3*: There is a positive relationship between social alignment and quality of customer services.*

RRESEARCH METHODOLOGY

Operationalization of constructs

The measurements for each construct are shown in Table 1.

Components	Items	Measurements
Dependent variable		
Customer Service Quality	CSQ1	Frequency of introducing new services and products (Menor and Roth 2007).
	CSQ2	Degree of identifying and diagnosing customer needs (Menor and Roth 2007).
	CSQ3	Extent of new offerings based on customer needs (Meno and Roth 2007).
	CSQ4	The degree to which the business strategies are driven by beliefs about how to create greater value for customers (Narver, Slater, and MacLachlan 2004).
	CSQ5	The degree to which the business objectives are driven primarily by customer satisfaction (Naver, Slater and MacLachlan 2004).
Independent variables		
Strategic Alignment	STA1	The degree to which the formulation of new service development strategy is supported by the current business processes (Menor and Roth 2007).
	STA2	The degree to which the current business processes can respond to changes in the competitive environment (Menor and Roth 2007).
	STA3	The degree to which the enterprise seeks out information actively to support business

		needs (Menor and Roth 2007).
	STA4	The degree to which ideas for new service/product development are largely driven by the service's overall business strategy (Menor and Roth 2007).
	STA5	The degree to which policies and procedures are established to deliver excellent customer service (Schneider et al. 1998).
Operational Alignment	OPA1	The degree to which information systems are established to share available market information (Kohli et al. 1993).
	OPA2	The degree to which information systems can quickly detect changes in our customers' product preferences (Kohli et al. 1993).
	OPA3	The degree to which information systems can quickly detect fundamental shifts in our industry (e.g., competition, technology) (Kohli et al. 1993).
	OPA4	The ability of information systems to measure customer satisfaction systematically and frequently (Naver, Slater and MacLachlan 2004).
	OPA5	The degree to which information systems can quickly recognize crucial changes made to major customers (Naver, Slater and MacLachlan 2004).
	OPA6	Degree of system standardization (Bieberstein et al. 2005)
	OPA7	Degree of system modulization (Bieberstein et al 2005).
Social Alignment	SOA1	The degree to which top management regularly discusses competitors' strengths and strategies (Narver et al. 2004).
	SOA2	The degree to which domain knowledge is frequently shared among IT and business managers (Reich, Benbasat 2000).
	SOA3	The degree to which an open communication and teamwork environment are established in the customer service unit (Schneider et al. 1998).
	SOA4	The degree to which a common understanding between managers in customer service units and information systems units regarding how to use information technology to improve customer service (Ray et al. 2004).
	SOA5	The degree to which managers in the information systems unit understand the business operations of the customer service unit (Ray et al. 2004).

Table 1. Measurements for Alignment Construct

Data Collection

To test our hypotheses, we target at the companies whom have applied the concept of service integration in their customer service systems. Developed upon IBM SIMM, four levels of service integration for customer service systems are proposed: data integration, application and functional integration, process integration, and eco-system integration. The detail definition of each level is shown in Table 2. Data were collected using a web questionnaire instrument. The respondents were first asked to select the service integration level of their customer service system. Only those respondents whose service integration level is equal to or higher than level 1 (data integration) are eligible to answer the remaining questionnaire, because based on our assumption, their companies have achieved or at least on the road of service orientation. The total data set constitutes a representative sample of n=300. Among all returned questionnaires, 96 were found to be complete and usable; this represented a response rate of 32 percent.

Among all the respondents, 38 are in the data integration level, 19 are in the application and function integrated level, 23 are in the process integration level, and 16 are in the eco-system integration level. Besides, our samples show that 51% of respondents have worked for two years and 37% have worked between 2 and 5 years. The majority of respondents' companies have more than 1000 employees and have capitals between 2 and 10 ten million. Most of the companies' annual sales are between two and ten million dollars. At last, most samples belong to computer and peripherals industry.

Level	Description

Data integration	The organization owns a basic enterprise website for customers to send comments and complaints. The website has an independent member system, from which customers can browse the website to join member, subscribe company e-paper, search information about the products and services, apply for services, or give comments. There is no direct connection between the website's member system and the company's inner CRM system. The employees of the customer service have to manually transform the data of the website's member system and import the data into the CRM system for further processing the requests for the customers.
Application and functional integration	The enterprise website has connections to the internal (e.g. CRM, ERP) and external (e.g. SCM) systems of the organization. There are standardized format of transformation (e.g. XML). The transformation can be scheduled as automatically executed tasks within a certain period by batch, or be designed as synchronized tasks to import data synchronously into other related systems of the organization without manual operations. The automation only refers to those data interchange with no flows (e.g. receive order form or add new member). For the processes which are involved with flows or complicated logistics should rely on manual operation or other process to be accomplished.
Process integration	For enterprise the interaction between internal/external systems becomes more automatic. It not only makes customers register the services on line and transfers data into the internal system automatically but also disposes the processes of business knowledge (e.g., identify a form which the departments belong to, understand how to dispose in different situation). For example, when a user makes an order, the system will activate the processes to fulfill the order needs automatically, if the order involves the cooperation of external factories and stores, system will sends the order information to them in order to reach the best route planning and fast to fulfill the order needs.
Eco-system integration	Any service component is modulized and independent. To fulfill customer needs, the system is able to recombine different service components to form a new one. For example, customer service system can be divided into the following service components: member service, order service, and distribution service. User can selects the service which he needs and makes the service join to his systems or processes.

Table2. Definition of Service Integration Level for Customer Service Systems

Instrument Validation

We conduct factor analysis to assess the construct validity (Molla and Licker 2005). A minimum eigenvalue of 1 is set as cutoff value. We use principle component analysis and Varimax rotation method to extract factors. Each item loads with its hypothesized factor. There is no item with a factor loading less than 0.5 on all factors or greater than 0.5 on two or more factors. The result shows that our theorized constructs have a satisfactory validity. We use Cronbach's alpha to assess reliability. The alpha values range from 0.865 to 0.882, indicating adequate reliability. Convergent and discriminate validity are assessed afterwards. The result shows violations in five factors: OPA1, OPA4, CSQ3, CSQ4, and CSQ5. Therefore, we drop these factors, resulting in a model of 17 items.

RESULTS AND DISCUSSION

Results

Our samples are distributed across four levels of our proposed service integration level of customer service systems. We categorize the samples that belong to the level one and level two as weakly-matured service integration (SI), and those that belong to level three and level four are strongly-matured service integration. We test the impact of different alignment factors on customer service quality with the samples

of all integration levels first. The results are shown in Table 3. We find that operational alignment is not significant.

Model Summary								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.608(a)	.370	.350	0.89537	.370	18.031	3	92	.000

Coefficients (b)					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Strategic Alignment	.553	.092	.498	6.024	.000
Operational Alignment	.118	.092	.106	1.287	.201
Social Alignment	.369	.092	.332	4.018	.000

a. Dependent Variable: Customer Service Quality; b. Selecting only cases for which level <= 4

Table 3. Model Summary and Coefficients —The Full Samples

We then distinguish the samples into two groups (weakly-matured SI v.s. strongly-matured SI) and conduct the same test for each group. The results of the regression analysis for weak-matured SI samples are shown in Table 4. The results indicate that the p values of two factors – strategic alignment and social alignment – are 0.000 and 0.000 respectively, showing that both factors significantly lead to better customer service quality, thereby supporting hypothesis 1 and 3. On the other hand, the effect of operational alignment is insignificant with p value equals to 0.795.

Model Summary								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.597(a)	.357	.320	0.96290	.357	9.792	3	53	.000

Coefficients (b)					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Strategic Alignment	.555	.115	.536	4.818	.000
Operational Alignment	-.036	.137	-.029	-.261	.795
Social Alignment	.323	.120	.303	2.685	.010

a. Dependent Variable: Customer Service Quality; b. Selecting only cases for which level <= 2

Table 4. Model Summary and Coefficients (2) – Weakly-Matured SI Samples

Table 5 shows the regression results for testing the strongly-matured SI samples. The F test shows that the model is significant at $p<0.001$, indicating that the model can well explain the customer service quality. The strategic alignment is significant with p value=0.005, supporting hypothesis 1. The p value of

operational alignment is 0.012, supporting hypothesis 2, and the social alignment's p value is 0.027, supporting our hypothesis 3.

Model Summary								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.662(a)	.439	.391	0.77341	.439	9.124	3	35	.000

Coefficients (b)					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Strategic Alignment	.513	.170	.391	3.023	.005
Operational Alignment	.446	.168	.345	2.654	.012
Social Alignment	.363	.157	.306	2.313	.027

a. Dependent Variable: Customer Service Quality; b. Selecting only cases for which level >= 3

Table 5. Model Summary and Coefficients—Strongly-Matured SI Samples

Findings and Discussion

Three research findings are derived and discussed as follows.

Finding 1. A good strategic alignment leads to better customer service quality.

1a. Strategic alignment has the strongest impacts on improving customer service quality compared with the other two alignment factors.

Rockart, Earl and Ross (1996) have proposed that IT management must be knowledgeable about the strategic and tactical thinking of senior management to ensure that investments in IT are targeted at strategic priorities. Our study confirms this statement and furthering suggests that strategic alignment plays a significant role in improving customer service quality no matter the enterprise's service integration is strongly or weakly-matured. Further, it has the highest contribution to service quality compared with the other two alignment factors.

1b.Strategic alignment is particularly influential to customer service quality for enterprises with weakly-matured SI.

Comparing with Table 4 (enterprises with weakly-matured SI) and Table 5 (enterprises with strongly-matured SI), the standardized coefficients of strategic, operational, and social alignment are 0.536, -0.029, 0.303 and 0.391, 0.345, 0.306 respectively. The findings of the results show that enterprises with strongly-matured SI place equal emphasis on the three alignment factors; however those with weakly-matured SI place the greatest emphasis on strategic alignment. The reason may be that, for enterprises with weakly-matured SI, business processes are relatively simple and non-standardized, and therefore they are particularly difficult to support business strategies. Since executives must spend much more time working on the strategic alignment, the enterprises with high strategic alignment are able to deliver more distinguished customer service than their competitors.

Finding 2. Operational alignment can not contribute to superior customer service quality for enterprises with weakly-matured SI; however it turns out to be a significant contributor when SI becomes more matured.

Day (1994) proposes that all organizations should tinker with their procedures and practices and take actions aimed at improving productivity and customer satisfaction by open minded inquiry. Our result of findings suggests that Day's argument is only true when the enterprise has strong SI. The findings in Table 4 (enterprises with weakly-matured SI) show that operational alignment can not lead to successful customer service quality (with standardized coefficient -0.029 and p value 0.795), reflecting the fact that enterprises with weakly-matured SI don't think a well-aligned IT system can bring any customer benefits. In SOE, the process design is real-time and dynamic based on execution results of sub-processes (Crawford et al. 2005). However, enterprises with weak SI usually do not have capabilities to design such processes, and therefore even their information systems can align with their processes, few benefits can be delivered.

Finding 3. No matter the enterprise's SI is weakly or stongly-matured, social alignment is significant to customer service quality.

Our study confirms that social alignment plays a significant role in improving customer service quality no matter the enterprise's service integration is strongly or weakly-matured. A well communication channel reduces the information gap between IT and others departments. It effectively helps employees understand the advantages that IT can support. When each department provides clear systems' requests to IT department and discuss the feasibility with the IT personnel, the enterprise's IT planning can become more and more aligned with business planning. Such design facilitates a continuous communication with customers, effectively assisting enterprises to deliver innovative customer services and retain customers with good service quality.

The contribution of this research is multi-folded. Enterprises at different level of SI can determine which alignment should be focused on. The validated customer service quality measures and alignment measures can also help managers better gauge the shortcomings of existing customer service system. Besides, IT researchers can build upon this model to further examine the factors that are discovered. This model has limitations. Although we propose three business-IT alignment factors, there may be other alignment categories that we haven't discovered. In the future, we can extend our proposed framework to include other alignment factors, making this model a more general principle that can effectively help managers to measure all kinds of systems or processes. Besides, to simplify the research design, we use IBM's service integration mutuality model to measure the level of service integration in enterprises' customer service systems. However whether IBM's model is industry-wide accepted still needs to be further justified. Furthermore, we make assumptions that enterprises are service-oriented if they deploy the concept of service integration. This assumption also needs to be verified in the future work.

REFERENCES

Bieberstein, N., Bose, S., Walker, L., and Lynch, A. (2005). "Impact of service-oriented architecture on enterprise systems, organizational structures, and individuals," *IBM Systems Journal, 44*(4), 691-708.

Buxbaum, P. (2001), "Measuring alignment," *Computerworld*, *35*(19), 46.

CFO Publishing Corporation. (2003), *The new it value proposition: Focus on business process optimization, not cost cutting*. Boston: MA.

Chan, Y. E.(2002), "Why haven't we mastered alignment? The importance of the informal organization structure," *MIS Quarterly Executive, 1*(2), 97-112.

Clemons, E. K., and Row, M. C. (1992), "Information technology and industrial cooperation: The changing economics of coordination and ownership," *Journal of Management Information Systems, 9*(2), 9-28.

Crawford, C. H., Bate, G. P., Cherbakov, L., Holley, K., and Tsocanos, C. (2005), "Toward an on demand service-oriented architecture," *IBM Systems Journal, 44*(1), 81-107.

Day, G. S. (1994), "The capabilities of market-driven organizations," *Journal of Marketing, 58*(4), 37-52.

Huang, C. D., and Hu, Q. (2007), “Achieving IT-Business strategic alignment via enterprise-wide implementation of balanced scorecards,” *Information Systems Management*, *24*(2), 173-184.

IBM Global Service (2005), “Increase flexibility with the Service Integration Maturity Model (SIMM)” , (accessed June 16, 2008), http://www.ibm.com/developerworks/ webservices/library/ws-soa-simm/

IBM Summit (2004), "Services Science: A New Academic Discipline? The Architecture of On Demand Business Summit Report," (accessed March 24, 2008), http://domino.research.ibm.com/comm/www_fs.nsf/images/fsr/$FILE/summit_report.pdf

Kohli, A. K., Jaworski, B. J., and Kumar, A. (1993), “MARKOR: A measure of market orientation,” *Journal of Marketing Research*, *30*(4), 467-477.

Luftman, J. (2003), “Assessing IT/business alignment,” *Information Systems Management*, *20*(4), 9-15.

Maes, R., Rijsenbrij, D., Truijens, O., and Goedvolk, H. (2000), “Redefining business-IT alignment through a unified framework,” Amsterdam: Universiteit van Amsterdam, Department of Information Management.

Menor, L. J., and Roth, A. V. (2007), “New service development competence in retail banking: Construct development and measurement validation,” *Journal of Operations Management*, *25*(4), 825-846.

Molla, A., and Licker, P. S. (2005), “Perceived E-Readiness Factors in E-Commerce Adoption: An Empirical investigation in a developing country,” *International Journal of Electronic Commerce*, *10*(1), 83-110.

Moody, K. W. (2003), “New meaning to IT alignment,” *Information Systems Management*, *20*(4), 30-35.

Narver, J. C., Slater, S. F., and MacLachlan, D. L. (2004), “Responsive and proactive market orientation and new-product success,” *Journal of Product Innovation Management*, *21*(5), 334-347.

Oh, W., and Pinsonneault, A. (2007), “On the assessment of the strategic value of information technologies: Conceptual and analytical approaches” *MIS Quarterly*, *31*(2), 239-265.

Peak, D., and Guynes, C. S. (2003), “The IT alignment planning process,” *Journal of Computer Information Systems*, *44*(1), 9-15.

Ray, G., Barney, J. B., and Muhanna, W. A. (2004), “Capabilities, business processes, and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view,” *Strategic Management Journal*, *25*(1), 23-37.

Reich, B. H., and Benbasat, I. (2000), “Factors that influence the social dimension of alignment between business and information technology objectives,” *MIS Quarterly*, *24*(1), 81-113.

Rockart, J. F., Earl, M. J., and Ross, J. W. (1996), “Eight imperatives for the new IT organization,” *Sloan Management Review*, *38*(1), 43-55.

Schneider, B., White, S. S., and Paul, M. C. (1998), “Linking service climate and customer perceptions of service quality: Test of a causal model,” *Journal of Applied Psychology*, *83*(2), 150-163.

Slater, S. F., and Narver, J. C. (1999), “Research notes and communications: Market-oriented is more than being customer-led,” *Strategic Management Journal*, *20*(12), 1165-1168.

Tallon, P. P., and Kraemer, K. L. (1999), “A process-oriented assessment of the alignment of information systems and business strategy: Implications for IT business value,” *For Submission to the Fourth Americas Conference on Information Systems (AIS)*, Maryland, USA, 1-10.

Weill, P., Subramani, M., and Broadbent, M. (2002), “Building IT infrastructure for strategic agility,” *MIT Sloan Management Review*, *44*(1), 57-65.

Weiss, J. W., Thorogood, A., and Clark, K. D. (2006), “Three IT-business alignment profiles: Technical resource, business enabler, and strategic weapon,” *Communications of AIS*, *2006*(18), 676-691.

Zhu, K., Kraemer, K., and Xu, S. (2003), “Electronic Business Adoption by European Firms: A Cross-country Assessment of the Facilitators and Inhibitors,” *European Journal of Information Systems* (12), 251-268.