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Hsin-Lu Chang
*National Chengchi University*, hchang@mis.nccu.edu.tw

Wan-Ting Shen
*National Chengchi University*, 94306019@nccu.edu.tw

Pei-Yu Lan
*National Chengchi University*, 94306004@nccu.edu.tw

Chao-Jung Lin
*National Chengchi University*, 94303008@nccu.edu.tw

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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

Shen, Wan-Ting, National Chengchi University , No.64, Sec. 2, Jhihnan Rd., Wunshan District, Taipei City 116, Taiwan (R.O.C.), 94306019@nccu.edu.tw

Lan, Pei-Yu, National Chengchi University , No.64, Sec. 2, Jhihnan Rd., Wunshan District, Taipei City 116, Taiwan (R.O.C.), 94306004@nccu.edu.tw

Lin, Chao-Jung, National Chengchi University , No.64, Sec. 2, Jhihnan Rd., Wunshan District, Taipei City 116, Taiwan (R.O.C.), 94303008 @nccu.edu.tw

## Abstract

*Due to the huge market potentiality, profuse production resource such as workforce and land, and low production costs in China, many international high-tech enterprises are moving their production line to China. Accompanying production offshoring is the transfer of Information Technology (IT) to ensure that the production processes remain efficient and effective at home and abroad. Many enterprises however encounter problems in transferring their IT to China, especially when the IT is an inter-organizational system (IOS), which is across organizational boundaries and involves the management of relationships among participants. In order to understand how to successfully transfer IOS to China, we aim to find out key relational factors of IOS performance in China through an observation of a binary relationship built upon an e-procurement system between a Taiwanese PC ODM (Original Design Manufacturer) and its Chinese suppliers. Based on the relational view of the firm, four relational factors are proposed and examined. The results show that IOS specific investments and effective IOS governance most strongly affects the result of IOS transfer to China, whereas complementary resource endowment has least influence.*

*Keywords: Relational view, Inter-organizational systems, IT transfer, China.*

# 1    INTRODUCTION

Due to the huge market potentiality, profuse production resource such as workforce and land, and low production costs in China, many international high-tech enterprises are moving their production line to China. They create a broad and deep supply chain within China that produces many of the parts and components the high-tech industry uses. This shift makes China the world's major high-tech product manufacturing center. As China science and technology newsletter reveals, China's import and export volume of high tech products hits an amount of USD 415.96 billion in 2005, with an increase of 27.2% compared with the preceding year (Feb. 28, 2006).

Accompanying production offshoring has been the relocation of business processes and tasks from home country to China. While these shifts are disruptive, they usually create demands for the transfer of Information Technology (IT) to ensure that the production processes remain efficient and effective at home and abroad. However, many enterprises encounter problems in transferring their information systems to China. The lower level of IT maturity in China may be one of the reasons. According to the World Economic Forum (December 2003), China's combined ability to produce, develop, and utilize information technology ranked forty-third in 2002, but dropped to fifty-first in 2003. Furthermore, the levels of technology development are different among areas or provinces, and the growing rate of network can't fit the demand of fast growing population.

Besides immature information infrastructure, barriers can also come from business, legal and cultural perspectives (Tan and Wu 2004, Wang 2002). For example, Tan and Wu (2004) find firms in China consider the "privacy of data and security issues" and "inadequate legal protection for Internet purchases" as the top two obstacles to e-commerce diffusion. Mao and Palvia (2006) demonstrate that behavioral beliefs in usefulness, compatibility, visibility, and result demonstrability highly influence the formation of attitude to IT acceptance in China. In addition, Hsieh et al. (2006) declare that Chinese firms' information orientation, which is the deeply rooted set of value and beliefs regarding information acquisition and dissimilation, is positively related to e-business adoption. Xu et al. (2004) investigate organizational adoption of e-business in the United State and China and find four major differences. First, technology competence of China firms is more critical to e-business adoption than of United States firms. Second, opposition to United States, resource advantages come with large firm size seem to moderate the negative effect of structural inertia. The larger a firm size, the higher possibility to adopt e-business in China. Third, in the aspect of global scope, increased complexity associated with greater scope tend to inhibit e-business adoption in China. At last, government regulation plays a more critical role in China than in United States.

The above studies emphasize that the transfer of IT to China can be complex. We can expect that more complicated issues arise when the IT is an inter-organizational system (IOS), which is across organizational boundaries and involves the management of relationships among participants. Additional risks and conflicts may incur during the IOS transfer such as problems of responsibility, coordination, sharing of costs and benefits, and concerns about competitive position (Kumar and Van Dissel 1996). For example, some researchers have noticed that IOS performance in China is affected by a particular type of buyer-supplier relationships called 'guanxi', which is the pronunciation of relationship in Chinese and refers to a system of personal connections that carry long-term social obligations (Lu and Bjorkman 1997). It is interesting, then, that the major issues concerning the transfer of IOS to China should include not only the legal, cultural, technical, and behavioral differences, but also the change of buyer-supplier relationships. IOS performance can be generated through the investment of inter-organizational relations such as decision and operation integration, mutual investment in relation-specific assets, and information sharing (Lee 2000, Kim and Umanath 2005, Wang et al. 2006). When IOS transfers to China, all these previous relationship investments are missing and need to re-make, adding the difficulties to retain IOS performance. It is this challenge which is addressed here. That is, what are the important relationship-associated factors that affect IOS success in the context of China?

The purpose of this paper is to illustrate how problems may arise when global enterprises in China neglect the investment of relational assets during the IOS transfer process. We propose a model based upon relational view literature and develop propositions regarding relational investments that can foster the transfer of IOS to China. The experiences of a high-tech multi-national enterprise attempting to transfer its e-procurement system to China are then examined. We find that the performance of this system in China is relatively unsatisfactory comparing with in Taiwan and western countries. The enterprise receives grant complaints from Chinese users. Although there are significant top management support and great user participation, factors that foster IOS relationship such as inter-firm knowledge sharing activities are not provided. Insight from this model and the case can help managers and researchers: (1) identify important relational factors in IOS transfer process and (2) determine which relational factor is relatively important to Chinese users so that a more effective IOS transfer process can be planned and executed.

## 2　　RESEARCH MODEL

Built upon relational view of the firm, our research model identifies IOS-specific relational factors and examines their influence on IOS transfer process in the context of China. It is employed later in interpreting the case.

### 2.1　　Relational View of the Firm

The relational view of the firm posits that a firm's critical resources and capabilities may extend beyond organizational boundaries and may be embedded in inter-firm resources and processes. Dyer and Singh (1996) identify four relational resources of inter-organiazational competitive advantage: (1) relation-specific assets, (2) knowledge sharing routines, (3) complementary resources, and (3) effective governance. Relation-specific assets include tangible and intangible assets specialized in conjunction with the assets of partners. Subramani and Venkatraman (2003) classify 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. Inter-firm Knowledge-Sharing Routines refer to a regular pattern of inter-firm interactions that permits the transfer, recombination, or creation of specialized knowledge (Grant 1996). These are institutionalized inter-firm processes designed to facilitate knowledge exchange between partners. 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). An effective governance structure can minimize transaction costs, thereby enhancing efficiency (Williamson, 1985, North, 1990, Dyer and Singh, 1998). It includes third-party enforcement of agreements and self-enforcing agreements.

We use Dyer and Singh's classification scheme as the basis to identify four key IOS-related relational resources: (1) IOS-specific investments comprising the tangible and intangible asset specificity, (2) IOS knowledge sharing routines comprising dedicated IOS knowledge sharing activities and partner-specific absorptive capacity, (3) IOS complementary resources comprising strategic and organizational complementary resources, and (4) IOS governance, including the mechanisms for IOS performance and risk management. The research model is shown in Figure 1. The following discussions describe the research model and provide propositions that are later employed to help understand the IOS transfer process in the context of China.

## 2.2 IOS-Specific Investments

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 (Subramani and Venkatraman 2003). In China, tangible assets specificity is often shown in the form of joint IOS development teams. According to a case study of Cisco and Xiao Tong in China by Lu et al. (2006), the cross-organizational implementation team is one of critical success factors of IOS. 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. According to Lu et al. (2006), inter-organizational business process re-engineering (BPR) plays an important part for IOS success in China. In their case study, the inter-organization BPR in China includes two parts. The first one is the adjustment of processes. Non-value-added parts of business processes are erased after the implementation of IOS. The second part is the formulation of new inter-firm cooperation. Both the focal firm and the partners alter their processes and redefine their duties and responsibilities to ensure the smooth operation of IOS. The following proposition is set forth:

Proposition 1   The success of transferring IOS to China can be affected by the investment of (1) tangible IOS assets and (2) intangible IOS assets.
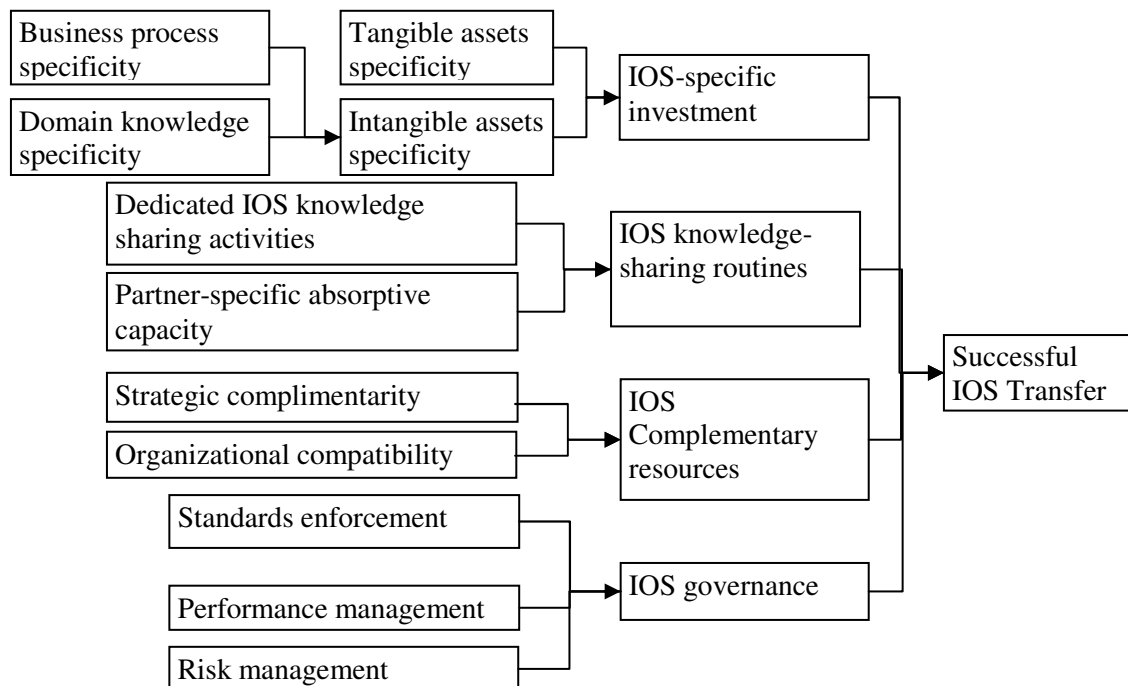


*Figure 1.        Factors affecting the transfer of IOS to China*

## 2.3 IOS Knowledge Sharing Routines

IOS knowledge sharing routines are defined as regular patterns of inter-firm interactions that permit the transfer, recombination, or creation of knowledge specifically about the IOS (Patnayakuni 2006).

There are two key components of IOS 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 and Singh 1998). According to Hitt et al (2004), 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. 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. These two performance dimensions are found to be an increasing function of the local firm's ability to acquire, assimilate, and integrate the foreign partner's distinguishing technologies or tacit knowledge. A local partner's high absorptive capabilities to absorb and assimilate its counterpart's tacit knowledge will lead to better overall performance in general and better Return-on-Investment and local sales in China. The following proposition is set forth:

Proposition 2   The success of transferring IOS to China can be affected by the existence of (1) dedicated IOS knowledge sharing activities and (2) partner-specific absorptive capacity.

## 2.4    IOS Complementary Resources

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: strategic complementarity and organizational compatibility. Strategic complemntarity includes the investment of complementary systems that 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). 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 strategic complementarity, organizational compatibility is also important to the IOS success. We define organizational compatibility as the situation in which the culture, process, and internal applications are compatible enough to facilitate coordinated IOS operations. 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. Also, Luo (1997) argues that the selection of complementary partners results in improved international joint venture performance as well as cross-country IT development. The following proposition is set forth:

Proposition 3   The success of transferring IOS to China can be affected by the existence of (1) complimentary strategic resources and (2) compatible organizational resources.

## 2.5    IOS Governance

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). The effective IOS governance mechanisms should include the ability to enforce partners to follow the standards of procedures (SOP) determined by top management. In addition to SOP enforcement, the mechanisms that support performance and risk management are also preferred. That is, IOS should enable companies to share performance information relevant to the relationship, e.g. exchange of

production/sales data, sharing promotion plans, and so on. It should also enhance companies' ability to monitor and control the partners' operation information (such as production schedule, or inventory levels, etc), performance, and the transactions status (Kim and Umanath, 2005). According to Skin et al. (2007), the efficiency of external information sharing in China is significantly affected by Chinese guanxi, and thereby an effective IOS governance structure is expected to bring enormous opportunities for improving efficiency, flexibility, and timeliness of Chinese supply chain integration. The proposition is as follows:

Proposition 4   The success of transferring IOS to China can be affected by the development of governance mechanisms for (1) SOP enforcement, (2) performance management, and (3) risk management.

# 3      RESEARCH METHOD

This section describes the validity and reliability of the case study method employed. Since the main purpose of this case study is to gain insight based on relational view of the firm that provides a greater understanding of the problems involved in the transfer of IOS to China, the case is employed to illustrate the theory, not to develop or test the theory. Researchers suggest that employing the case in such positivist fashion requires attention to construct validity, external validity, and reliability (Yin 2003). Note that internal validity is not an issue here.

According to Yin (2003) and Cooper (2000), construct validity can be supported by using three approaches: multiple data collection, multiple sources to identify a proposition, and getting feedback from a key informant. The primary data sources are collected via phone interviews. We interview 12 employees of the focal company and 8 employees of Chinese suppliers (see first row in Table 1). All these employees are selected because they are directly impacted by the IOS and they use the IOS most frequently in their daily routines. Other information is gathered from firms' official web-site and industry white paper. Table 1 also shows the frequencies of the presence of proposed factor items over all interview records where each item has at least one observation, further supporting construct validity. Moreover, all interviews are tape recorded and then transcribed into manuscripts before analysis. The manuscripts are reviewed by the Chief Technical Officer (CTO) of the focal company for getting feedback.

External validity establishes the domain to which a study's findings can be generalized (Yin 2003). We use two approaches that are suggested in past literature: employing a case that can reflect general industrial situation (Yin 2003) and using participants' own interpretations of events and processes (Cooper 2000). This case describes a general phenomenon in high-technology industry where the leading companies move their production line to China and these companies all face the issue of transferring information systems. In addition, the suppliers we select in this case are not dedicated to the focal company. Besides trading with the focal company, they also have business linkages with other Multi-National Enterprises (MNE) in the same industry sector. Through the interviews, they have mentioned that these MNE encounter similar problems when transferring their IOS to China.

Reliability is demonstrated by the appropriate use of case study protocol in data collection phase (Yin, 1994). We conduct telephone interviews from December 2005 to September 2006. Each interview is confined to one to two hours. Follow-up e-mail inquiries are conducted when necessary. According to the telephone interview guide suggested by Sambamurthy and Zmud (1999), extensive notes are taken during each telephone interview with a structured interview protocol designed beforehand to accommodate note taking. The notes are analyzed in terms of how it matches the identified items in our proposed framework. This allows several evidences from interview records to be identified associated with the four factors we have proposed (Table 1). Interviewers then forward these summaries to interviewees for comments and correction. The analyses presented below are formulated from the summarized data.

| Information Source | | Focal Company (Computers Inc.) | | | | | | | | | | | | | Chinese Suppliers (S1~S7) | | | | | | | | | |
| | | IT Department (Taiwan) | | | Procurement Department (Taiwan) | | | | | | Procurement Department (China) | | | | S1 | S2 | S3 | S4 | | S5 | S6 | S7 | | |
| Factors | Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Total | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IOS-specific investment | Tangible assets specificity | 13 | 11 | 13 | 1 | 3 | 2 | 5 | 5 | 0 | 13 | 3 | 5 | **74** | 0 | 0 | 13 | 15 | 7 | 3 | 0 | 0 | **38** | **112** |
| | Business process specificity | 0 | 17 | 12 | 9 | 5 | 10 | 13 | 11 | 0 | 21 | 18 | 14 | **130** | 13 | 21 | 18 | 16 | 27 | 11 | 2 | 1 | **109** | **239** |
| | Domain knowledge specificity | 5 | 21 | 10 | 6 | 5 | 1 | 5 | 15 | 21 | 10 | 8 | 14 | **121** | 6 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | **12** | **133** |
| **Factor total** | | 18 | 49 | 35 | 16 | 13 | 13 | 23 | 31 | 21 | 44 | 29 | 33 | *325* | 19 | 21 | 32 | 33 | 35 | 15 | 3 | 1 | **159** | *484* |
| IOS knowledge sharing | IOS knowledge sharing activities | 6 | 23 | 12 | 7 | 7 | 12 | 15 | 14 | 21 | 20 | 9 | 25 | **171** | 4 | 14 | 27 | 9 | 13 | 4 | 4 | 7 | **82** | **253** |
| | Partner-specific absorptive capacity | 0 | 12 | 1 | 4 | 1 | 2 | 3 | 2 | 5 | 3 | 2 | 2 | **37** | 2 | 1 | 4 | 5 | 9 | 0 | 1 | 0 | **22** | **59** |
| **Factor total** | | 6 | 35 | 13 | 11 | 8 | 14 | 18 | 16 | 26 | 23 | 11 | 27 | *208* | 6 | 15 | 31 | 14 | 22 | 4 | 5 | 7 | **104** | *312* |
| IOS complementary resources | Strategic complementarity | 10 | 11 | 31 | 17 | 3 | 5 | 12 | 3 | 6 | 7 | 7 | 10 | **122** | 14 | 15 | 10 | 13 | 8 | 3 | 4 | 4 | **71** | **193** |
| | Organizational compatibility | 4 | 5 | 8 | 4 | 1 | 0 | 3 | 0 | 1 | 1 | 3 | 6 | **36** | 5 | 5 | 2 | 2 | 4 | 0 | 2 | 1 | **21** | **57** |
| **Factor total** | | 14 | 16 | 39 | 21 | 4 | 5 | 15 | 3 | 7 | 8 | 10 | 16 | *158* | 19 | 20 | 12 | 15 | 12 | 3 | 6 | 5 | **92** | *250* |
| Effective IOS governance | SOP enforcement | 0 | 16 | 16 | 7 | 5 | 3 | 8 | 5 | 1 | 21 | 14 | 17 | **113** | 9 | 6 | 16 | 4 | 8 | 9 | 0 | 3 | **55** | **168** |
| | Performance management | 2 | 15 | 5 | 9 | 10 | 6 | 3 | 6 | 5 | 12 | 9 | 10 | **92** | 18 | 11 | 27 | 17 | 15 | 0 | 0 | 0 | **88** | **180** |
| | Risk management | 2 | 0 | 0 | 2 | 4 | 5 | 3 | 0 | 1 | 0 | 3 | 2 | **22** | 2 | 9 | 19 | 6 | 11 | 0 | 1 | 0 | **48** | **70** |
| **Factor total** | | 4 | 31 | 21 | 18 | 19 | 14 | 14 | 11 | 7 | 33 | 26 | 29 | *227* | 29 | 26 | 62 | 27 | 34 | 9 | 1 | 3 | **191** | *418* |
| **Sum** | | | | | | | | | | | | | | **918** | | | | | | | | | **546** | **1464** |

*Table 1.*  *Sources of Information and Frequencies of Observations for Propositions*

# 4 CASE ANALYSIS

Computers Inc.[1] is one of main ODM (Original Design Manufacturer) companies which produce notebook, LCD monitor, PDA and phone in Taiwan IT industry. It was established in early 80's. Head office is set in Taipei with two factories in China. Total annual revenue reaches more than NT7,000 billion dollars with worldwide workforce over 20,000 in 2005. In recent years, Computers Inc. has moved its production line to China to maintain a cost advantage. With tighter linkage and increasing demand for purchasing activities conducted in China, the company request their Chinese suppliers to adopt a specific e-procurement system (EP) to facilitate communication and integration between both parties. In 2004, over 500 Chinese suppliers of company A have used this EP to receive orders.

This EP is part of the "Demonstration Project" sponsored by the Taiwanese MOEA (Ministry f Economic Affairs) with the purpose of initiating a strong and agile e-procurement network between first-tier Taiwanese ODMs and their second-tier suppliers. Fifteen ODMs are selected to participate in this project, and Computers Inc. is one of them. In 2001, this project has successfully linked more than 1,800 Taiwanese suppliers into this integrated network. Via the system, monthly forecast is sent to suppliers for preparing the production. According to the forecast, purchase order (PO) request is automatically generated and sent to suppliers in a week notice, including detailed product information and order amount. After suppliers confirm the PO, PO are automatically transformed into advanced shipping notices (ASN). Upon receiving the shipments, the buyers of Computers Inc. re-key the ASN into the ERP (Enterprise Resource Planning) system and then generate the invoices on a monthly basis.

After successfully implementing this system in Taiwan, Computers Inc. transfer the entire EP to China. Up to the present time, there are around 500 Chinese suppliers who use this system to transact with Computers Inc. Despite the system's wide adoption, the performance of this system in China is relatively unsatisfactory in terms of grant complaints from user sides. Eager to find the reasoning behind this, Computers Inc. partners with us to collect system usage experience from both buyer and seller sides and relate them to our proposed relational factors. The result can help us understand what aspects of these relational investments are not in place and how this contributes to a failed IOS transfer in the context of China.

## 4.1 IOS-specific Investments

There is a consensus that both Computers Inc. and suppliers should develop an IT infrastructure that tailors the EP needs. Users complain about the speed of connection. Every click to the next page needs about "three to five seconds, or even ten seconds" [Taiwan Buyer], making order placement a lengthy process, and "delaying the whole operating process up to one hour" [Supplier]. The unfriendly user interface worsens the situation. "The current EP only allows 10 items at most to be processed in a Web page, but one PO usually includes hundreds of items" [Supplier]. The system also does not support re-do function, which creates a lot of frustration. Users need to check "hundreds of boxes to fulfill a PO" [Supplier]. Once they check a wrong box, they need to start again from the beginning. In addition, the shortage of dedicated human resources for managing this EP reduces the usage of the system. Since Computers Inc. does not set an IT department in China, any IT-related question is forward to Taiwan for solution, which consumes a lot of time. Many Chinese users therefore prefer to "go back to traditional way (e.g. phones and emails) to process orders when any system problem comes up" [Chinese buyers].

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[1] This is not the organization's real name. I thank the management and employees at Computers Inc. for allowing me to interview them and their Chinese suppliers.

In addition, "the system doesn't fully support the procurement process in China" [Senior IT Manager]. Due to the volatile demand, Chinese suppliers are often required to fulfill orders in an urgent manner. Since the current system does not provide real-time ordering information, these urgent orders usually "do not go through the system but through manual ways such as phone and fax" [Chinese Buyer]. Furthermore, since theses urgent orders are not shown in the system in real time, they can not transform to ASN automatically, and therefore they are usually delivered without ASN. After the delivery, suppliers need to "manually key-in these ASN just for the purpose of documentation" [Suppliers]. The real benefits of ASN are missing. Lack of domain knowledge makes the situation worse. Since the China department is newly established, Chinese buyers "don't have much experience in operations and the system" [Taiwan Buyer]. The lack of experience makes them "incapable to prevail on suppliers how to use the system" [Taiwan Buyer]. In addition, "the high turnover rate of employees in China obstructs the knowledge accumulation" [Chinese Buyer]. The insufficient knowledge disables them to use the system properly. Besides, the lack of understanding partnering suppliers also causes problems. "Because Chinese buyers are not familiar with their suppliers, communication problems may exist" [Taiwan Buyer]. Since procurement decisions are made by sourcers in Taiwan, Chinese buyers are often not well informed of the most recent decisions due to the geographical distances, which easily cause misunderstanding when these buyers communicate with suppliers.

## 4.2    IOS Knowledge Sharing

The ineffective knowledge transfer mechanisms among users reduce the system performance. For example, due to cost concern, the training of the EP is outsourced to a Taiwanese IT service company. This IT service company only offers regular training sessions in Taiwan, and therefore "Chinese users need to find out their own way to learn the EP" [Senior IT Manager]. Typically, Chinese buyers learn the EP from their Taiwanese colleagues, who have taken the training courses as they come back Taiwan on business. When any new supplier connects with the system, three to four Taiwanese buyers are sent to offer its user representatives one to two-day on-site courses. These users are then responsible of teaching other colleagues in their own company. Such knowledge transfer process is problematic. First, due to significant growth and change at Computers Inc. Taiwanese buyers that are sent to teach Chinese buyers and suppliers are "either new to the company or new to the areas they are representing" [Chinese Buyer]. "They also have little knowledge of doing business in China" [Suppliers]. Since these trainers have difficulties to articulate why activities are being done, users can hardly consent to any fundamental changes to their procedures and work processes due to the use of the system. The second problem results from the lack of dedicated IT team for answering requests for help. The high turnover rate means that when a user encounters a system problem, it is very possible that he/she can not find the original trainer for assistance. Many Chinese suppliers complain that they "do not know whom to report the system problem and ask for help" [Suppliers]. For Chinese buyers, the requests for assistance often take a convoluted route. They report their problems to their supervised Taiwanese sourcer, who then transfers the problem to the outsourced Taiwanese IT service centre. Such indirect connection for assistance lengthens the required time for problem solving. "It takes at least two days for having somebody replying my request" (Chinese buyer). Because the problem often can not be solved within the users' cycle time, the users tend to solve the problems on their own and arbitrarily decide when the problem is big enough to warrant a call for help. Problems mount up and are neither shared nor resolved companywide.

## 4.3    IOS Complementary Resources

One of the important strategic IOS complementary resources is users' perception of IOS benefits. Since all of the suppliers understand well that the EP has become the only channel for Computers Inc. to place orders, and "they can not get any orders if they refuse to use the system" [IT Manager]. The EP therefore becomes a strategic necessity rather than just a strategic benefit. Although the coercive

adoption of the EP increases the system usage rate, many user representatives do not think the current EP brings much convenience to their daily operation. Some suppliers complain about the system's inability to handle product returns and others struggle with inaccurate and inconsistent order information. In addition, the current EP only automates the order requisition process, which is relatively a minor aspect of the procurement problems that companies face. Procurement is a closed-loop process that begins with the product requisition and ends once the invoice for the product is paid. The current EP however does not leverage any existing complementary system such as warehouse management systems, quality control, and accounts receivable to facilitate the entire purchasing cycle, and nor do its suppliers have the capability to develop these complementary systems. Besides, Chinese firms do not have processes and cultures that are compatible enough to realize the strategic benefits of IOS. "We find Chinese users are relatively conservative" in terms of a general cautious stance toward adopting new procedures and systems [Taiwan Buyer]. Any action should be based on "what they have been told by upper management", which reduces the potential to explore new and effective pathways of doing things through the EP [IT Manager].

## 4.4    IOS Governance

Ineffective IOS governance reduces the willingness of Chinese users to use the EP. For example, suppliers need to take responsibility of any loss of shipments even the loss may due to the mistakes made by the warehouse of Computers Inc. Since the current EP does not integrate with warehouse management systems, whenever the loss occurs, suppliers "have no way to track what happens and complaints seem to be made in vain" [Chinese Supplier]. In addition, the EP does not have any mechanism to control the potential opportunism that comes in different forms such as arbitrary changes in predefined volume allocation, last-minute order changes or cancellations, or mishandling of suppliers' shipments. Such opportunistic behavior creates a great deal of tension between Computers Inc. and its suppliers. Some big Chinese suppliers start to interact with customers directly. They bypass the ODM and directly ship high-priced, customized parts to the customers so they can "trace the items more easily without interference from Computers Inc., even though Computers Inc. have asked them to deliver those parts via its own hub" [Chinese Supplier].

Moreover, although Computers Inc. forces Chinese buyers and suppliers to process all orders through this EP, the company does not provide any incentive for obeying this rule or punishment for violation. Chinese users are rewarded based on their job performance, with no obvious incentives for using the system, and therefore many users prefer the old ways of doing things (i.e. processing orders through phone calls and emails), because "the communication is more direct and timely through the traditional way" [Chinese Buyer]. Furthermore, though the system is initiated by the senior vice president in procurement, the whole system is developed by Taiwanese IT department. Many times when IT staff makes suggestion to promote the system usage, Chinese user representative veto the suggestion because they think the system is originated for meeting the needs of Taiwanese users, not Chinese and the vetoes are agreed by upper management and thereby the suggestion is overturned [IT Manager].

## 4.5    Summary

Table 1 shows frequencies of the presence of four propsed relational factors over all interview records. From the total number of items, each factor's items' relative frequencies are the following: IOS-specific invetstment items 33.1%; IOS knowledge sharing items 21.3%; IOS complementary resource items 17.1%; and IOS governance items 28.5%. Overall the IOS-specfic investment and IOS governance-related items play the most significant role in IOS transfer in China (Figure 2). We next investigate which items are the most important in IOS transfer. This is carried out by analysing the frequencies of each item and identifying items in each fctor whose relative frequency is over 30%. The most common items are: (1) business process specificity; (2) dedicated knowledge sharing activities; (3) strategic complementarity; (4) SOP enforcement; and (5) performance management. The result shows that the most effective way to transfer IOS to China can be explained by the following logic.

The company should first divide the current processes conducted with Chinese partners into clearly understood activities and precisely specify the output requirements for each activity. Then, the company needs to customize its IOS to align with the requirements of each acitivty. Second, the company has to prepare training sessions and system guidance document for new and old users and designate a specific team to help system transfer. This team is assigned dedicated job responsibility for problem solving, so for each task users clearly know whom to report the problem. Third, it is important for users to perceive system benefits, so they are more willing to spend efforts and time to learn the system. Often users are more easy to realize the benefits if the system in use can complement with other existing systems to bring new organizational capabilities. Finally, it is necessary for the company to design effective governance mechanisms that can provide enough incentives for users to follow system requirements, monitor the data use, control data accuracy and ensure all data sent by the company can be well received and received in time.
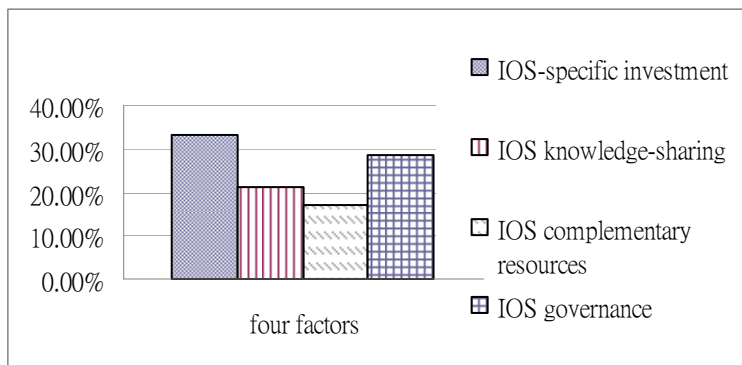


*Figure 2.        Relative frequencies of research items*

# 5        CONCLUSION

The proposed framework has discussed four potential relational factors that may affect the transfer of IOS to China. Computers Inc., a major Taiwanese PC ODM, is chosen to test the proposed framework. Through the case study, we find IOS-specific investment and effective governance are identified as the most important relational factors whereas IOS complementary resource has least effect. The fact that governance factors are significant to IOS transfer may result from suppliers' weak market power in China. In this case, suppliers are forced to adopt the IOS provided by Computers Inc. They do not have choices if they want to make business with Computers Inc. In the condition that suppliers are not perfectly happy to adopt the IOS, they only concern how well the system can support their business operations. Furthermore, 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. That is, suppliers may feel strongly unsecured if the system does not provide any function to prevent buyers' opportunistic behavior. On the other hand, IOS complementary resources factor has extremely little effect on IOS transfer in this case. Perhaps it is because the IOS complementary resource is a relatively strategic consideration that is less considered by Chinese supply chain players while they usually spend 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. Moreover, a low investment in IOS-specific assets in China in terms of supportive technological and managerial infrastructure, processes, and knowledge has made IOS transfer a daunting job. The result surfaces Chinese firms' little knowledge about BPR. Finally, the case study conducted here provides an interpretation of a single IOS transfer project in an organization. Although significant insight can be gained from such interpretation, further investigation of the proposed framework in other cases should be pursued to enhance the generality of research findings.

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