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# The Influences of Employees and Managers on Interorganizational Systems: A Resources-Based Perspective

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# THE INFLUENCES OF EMPLOYEES AND MANAGERS ON INTERORGANIZATIONAL SYSTEMS: A RESOURCE-BASED PERSPECTIVE

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## Abstract

*Previous research has emphasized the importance of employees, managers and human efforts in general in attaining operational and strategic benefits from the use of IT. This paper focuses on how human efforts influence operational and strategic benefits attained from the use of the interorganizational systems (IOSs). A conceptual model is constructed combining transaction-cost economics, resource-based view, operational benefits and strategic benefits. The empirical data is acquired through a mixed-method approach by combining two qualitative case studies and a quantitative field study. The findings indicate that human efforts positively influence two distinctive IOS capabilities: cross-organizational business processes and cross-organizational transfer of information and knowledge. The data also show to some extent support for the hypotheses that cross-organizational business processes positively influence the attainment of operational benefit and cross-organizational knowledge transfer positively influence the attainment of strategic benefits.*

*Keywords: Interorganizational systems, resource-based view, IOS capabilities, Strategic benefits.*

## 1 INTRODUCTION

Organizations use various types of interorganizational systems (IOSs) to facilitate their interorganizational relationships (IORs). The benefits of using such systems include operational benefits such as the efficiency of automating manual processes and strategic benefits of creating new opportunities (Malhotra et al., 2005). Employees and managers, as boundary spanners, play an important role in boundary spanning activities. The human efforts are essential for processing transactions, ordering and delivery of products and services and the performance of cross organizational R&D projects.

The complexities of human social interactions and IT have led to different research findings regarding the influences of employees and managers. Nooteboom (2004) and O'Callaghan et al. (2006) assert that organizations develop relationships to improve their business processes, knowledge and learning abilities. Organizations cautiously select business partners that possess the required resource profiles and learn by intensifying their relationships with them (Jones et al., 1998). The majority of previous studies have argued that employees and managers are important for the attainment of operational and strategic benefits (Mata et al., 1995; Bharadwaj, 2000). The objective of this paper is to increase the understanding in this area by investigating the influences of human efforts on the use of the IOS and the consequent influences of IOS on performance. The resource-based view is used to investigate how human-based resources influence the development of IOS capabilities. Hence, the research question is how do employees and managers influence the use of IOSs and consequently the attainment of operational and strategic benefits.

The paper is organized as follows. Section two will briefly discuss the literature on IOSs and resource-based view. Section three will present the hypotheses and the conceptual model. Section four will discuss the empirical part of the study. Section five will discuss the implications of the empirical findings and finally, section six concludes the paper.

## 2 LITERATURE REVIEW

To qualify as an interorganizational system, it is necessary and sufficient for a system to be used by two or more organizations (Cash & Konsynski, 1985). Diverse types of IOSs have been distinguished including electronic data interchanges, extranets, shared databases and electronic-support supply chain management systems. The use of IOSs can yield significant transactional advantages such as communication efficiency, enhanced storage and processing capabilities (Malone et al., 1987; Bakos & Treacy, 1986). Transaction Cost Economics has been widely used to explain the role of IOSs in cross-organizational activities and reducing transaction costs (Clemons & Row, 1991; Gurbaxani & Whang, 1991; Weill & Vitale, 2001). Previous studies argued that interlinkage of business processes is an important driver for IORs and the development of IOSs (Prosser & Nickl, 1997; Teo et al., 2003). Recently, there is increased emphasis on the benefits of knowledge resources and on partner-enabled knowledge creation for long term advantage (Subramani & Venkatraman, 2003; Malhotra et al., 2005). Knowledge intensive cooperative social contexts among employees, business units and business partners are distinguished (Chen & Edgington, 2005). These contexts are favorable to the creation, coordination, transfer and integration of knowledge to achieve continual value innovation. For example, Malhotra et al. (2005) distinguishes various supply chain partnership configurations based on interlinked processes and information systems infrastructures that facilitate partner-enabled market knowledge creation.

This study applies the resource-based view (RBV) to analyze IOSs. RBV perceives each organization as a bundle of resources emphasizing the heterogeneity between organizations originating from different resources and different mechanisms of combining resources (Wernerfelt, 1984). The theory is based on economic theories of monopolistic and imperfect competition. Robinson (1933) emphasizes

the importance of diversity between organizations and imperfect competition in enabling organizations to obtain above normal returns. Penrose (1959) extends these theories by arguing that the organization “is basically a collection of resources” and the diversity between organizations results from different combinations of various resources. She argues that organizational growth is dependent on the speed of accumulation and assimilation of resources. Wernerfelt (1984) argues that resource position barriers, i.e. imitation barriers, can produce above normal returns influencing the strength or weakness of the organization. Later studies focus on various resource characteristics that lead to competitive advantage (Amit & Schoemaker, 1993; Dovev, 2002).

The resource-based theory was further developed when Barney presented a concrete theory to identify the needed characteristics of resources to create sustainable competitive advantage. Such resources are argued to be valuable in the sense that they exploit opportunities or neutralize threats in an organization’s environment, rare among an organization’s current and potential competitors, inimitable, and non-substitutable (Barney, 1991). Other researchers (Grant 1991; Powell et al 1997; Venkatraman 1997) have adopted and expanded Barney’s theory to include other resource characteristics such as resource durability, non-tradability, and idiosyncratic nature of resources. Grant (1991) distinguishes between resources and capabilities. Resources are basically inputs into the production process and capabilities are organization-specific, information-based processes that are developed through interactions among the organization’s resources. Teece et al. (1997) argue that the competitive advantage of organizations is influenced by the distinctive processes of coordinating and combining resources including difficult to trade knowledge assets and complementary resources. They emphasize path dependence contending that an organization’s previous investments constrain its future behavior and its opportunities for learning will be ‘closed in’ to previous activities and therefore will be transaction and production-specific.

Within the information systems field and related literature, the resource-based perspective is utilized to distinguish different types of IT resources and capabilities. Mata et al. (1995) and Powell et al (1997) argue that top management commitment and the organization of IT are valuable organization-specific resources. These resources can produce a competitive advantage for the organization when they are complemented with suitable human resources such as IT skills and organizational culture encouraging change and experimentation. Bharadwaj (2000) presents a classification scheme that distinguishes three types of IT-based resources. The first type comprises tangible resources including the physical infrastructure. The second type comprises the human IT resources including technical and managerial IT skills. The third type comprises intangible IT-enabled resources including knowledge assets and synergies enabled by IT. He demonstrates that organizations with high IT capabilities are likely to outperform on a variety of profit and cost-based performance measures. Teece et al. (1997) present a framework relying on dynamic capabilities that explains the competitive advantage of organizations from distinctive organizational processes. These organizational processes are formed by organization-specific assets and are influenced by their evolution path.

### **3 CONCEPTUAL MODEL**

Grant (1991) and Bharadwaj (2000) argue that when an organization combines various resources, it can develop capabilities that are specific to the organization and information-based. Prosser et al. (1997) and Subramani (2004) assert that relationship-specific investments can lead to important strategic relationships. By applying the logic of the RBV to interorganizational relationships, we argue that combining relationship-specific resources will produce IOS capabilities.

The different types of IOS-related resources can have distinctive effects. This paper focuses on human-based IOS related resources. IOS-related human resources comprise training, expertise and relationships between employees. Relationship-specific human-based resources are argued to positively influence IOS capabilities. IOS capabilities are the abilities and competencies developed within the relationship through the use of the IOS. A distinction is made between process-based and knowledge-based IOS capabilities. The first type --process-based IOS capabilities-- encompasses the

interlinkage of business processes across organizational boundaries. The management and employee efforts are important for ensuring successful interlinkage of processes. The management can sense the changes in the environment and respond by modifying the business processes to accommodate the changes. Similarly, the employees are in charge of the daily operational execution of business processes and they may require frequent meetings with their counterparts of the other organization to discuss the performance and execution of these processes. The second type --knowledge-based IOS capabilities-- encompasses the ability to transfer and share knowledge across organizations. The meetings of management and employees with their counterparts of the other organization are essential for this. The prior related knowledge and diversity of backgrounds of managers and employees affect the ability of the organization to recognize the value of new knowledge (Cohen 1990, Hamel 1991, Kogut 1988, Salk & Simonin 2003). Accordingly, human efforts and endeavors are important for successful transfer and sharing of knowledge across organizations. Hence,

Hypothesis 1a. Incorporating *human-based* IOS related resources that have a high degree of relationship specificity positively affects *process-based* IOS capabilities.

Hypothesis 1b. Incorporating *human-based* IOS related resources that have a high degree of relationship specificity positively affects *knowledge-based* IOS capabilities.

As the knowledge-based IOS capabilities involve the transfer and sharing of knowledge with the partner, they are expected to lead to the detection novel knowledge possessed by the partner (Nooteboom, 2004). The detection of novel knowledge and its subsequent application can have two imperative influences within the relationship. On the one hand, the knowledge can directly improve the current business-processes. The knowledge can have several origins such as R&D or related to best practices discovered from other organizations. The business partners can apply the knowledge to improve the effectiveness and efficiency of business processes. On the other hand, the successful sharing of knowledge may positively influence the obtainment of strategic benefits. Organizations that utilize the knowledge of their partners have an increased understanding of the environment and subsequently a broader range of opportunities and more effective actions. Such benefits may be obtained from the development of new products due to a richer understanding of the partner organization or sharing information regarding market trends that would provide a competitive advantage (Malhotra et al., 2005; Mukhopadhyay & Kekre, 2002).

Hypothesis 2a. Knowledge-based IOS capabilities positively affect process-based IOS capabilities.

Hypothesis 2b. Knowledge-based IOS capabilities positively affect the attainment of strategic benefits.

The interorganizational relationship at the operational level can be perceived as one organization providing products or services in exchange for compensation from the other organization. Potential benefits at the operational level include cost reduction, data error elimination, rapid invoicing, customer responsiveness improvement, efficiency gains, product quality monitoring and automation of boundary-crossing processes (Cash & Konsynski 1985, Chatfield & Bjorn-Andersen 1997, Johnston & Vitale 1988, Subramani 2004). Ahmad et al. (2001) argue that IOSs, and particularly EDI, provide cross-organizational integration. When the business-processes are successfully interlinked, the transacting organizations are able to react to latest changes and accordingly achieve higher performance. Mukhopadhyay et al. (2002) focus on the financial processes and argue that when the processes are automated and interlinked the authorization process can start at an earlier time than under manual transfer. The interlinkage of processes enable organizations to increase the efficiency and effectiveness of business processes and accordingly to decrease the transaction costs and increase the productiveness. Hence,

Hypothesis 3. Process-based IOS capabilities positively affect the attainment of operational benefits.

The accumulation of operational benefits can lead to the attainment of strategic benefits. The operational benefits can be evidenced in various aspects such as the reduction in costs, improved processing of orders or more efficient stock management. The accumulation of any of these aspects and the convergence of multiple aspects will lead to the attainment of more strategic benefits such as increasing the competitive advantage of the business partners or increasing the understanding of customer needs.

Hypothesis 4. Attainment of operational benefits positively affects the attainment of strategic benefits.

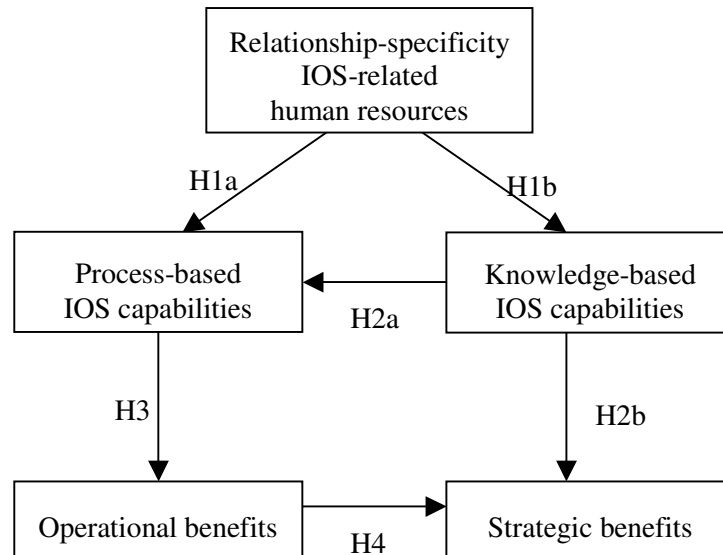


Figure 1. Conceptual model

## 4 THE EMPIRICAL STUDY

The following section will briefly discuss the methodology and research design. Subsequently, the findings of the case studies and field study are discussed.

### 4.1 Research design

This study adopts the triangulation principle (Webb et al. 1966). The objective is to use two types of triangulation: method triangulation and data triangulation. The methodological triangulation is realized by following a mixed method approach. The combination of qualitative case studies and a quantitative field study enables testing of the conceptual model and hypotheses from different perspectives and combining empirical precision with descriptive precision. Attewell and Rule (1991) emphasize the complementarity between case studies and field studies stating that ‘each is incomplete without the other’. The data triangulation is realized by gathering data through a variety of data sources within the case studies. The data sources include semi-structured interviews, organizational documents and public published information. The case studies and field study focus at dyadic interorganizational relationships as the unit of analysis. The two organizations are two separate, legally independent organizations and they can take decisions autonomously regarding their relationship with their environment.

### 4.2 Case studies

Case studies are useful to investigate phenomena in depth within their natural setting and when the focus is on contemporary events (Yin 2003). The propositions and the conceptual model are based on

theoretical and intuitive foundations. Hence, the aim of case studies here is to acquire more insights on the proposed causal links. Multiple case-study approach (Yin 2003) is adopted. The replication logic adopted in this study is theoretical replication, i.e. predicting contrasting results but for predictable reasons. Accordingly two case studies are selected: case A is characterized with low relationship-specificity of human-based IOS related resources and case B is characterized with high relationship-specificity of human-based IOS related resources. In order to select the appropriate cases, a number of organizations are contacted to conduct initial interviews and select appropriate relationships. Subsequently semi-structured interviews are conducted with business and IT executives. The interviews were mostly between 60 and 120 minutes and were recorded for transcription purposes. The interviews and other documentation are afterwards analyzed and the findings are discussed with the interviewees and other executives to ensure the interviews are interpreted correctly.

#### *4.2.1 Case A. The relationship between Global Automation Companion and Integrated Logistics*

Global Automation Companion (GAC) is a large globally operating industrial automation company based in the US. GAC supplies a broad product portfolio consisting of industrial automation products, systems and services that aid their customers in controlling and improving manufacturing processes. Its sales exceed \$ 3.5 billion. Product sales occur through a blend of direct sales, sales through distributors and system integrators. The case study focuses on the relationship between the GAC and Integrated Logistics. Integrated Logistics manages the storage process of the products designated for Europe, the Middle East and Africa (EMEA). Integrated Logistics is a subsidiary of a Dutch logistics group of companies. The services of Integrated Logistics include mainly the integration of different types of carriage and logistics and value chain services. Integrated Logistics has a dedicated warehouse for the storage of GAC products. The activities it provides for GAC are mainly warehousing activities.

Communication is conducted through multiple EDI connections between GAC and Integrated Logistics. Service orders of GAC EMEA are transferred to GAC US and then to Integrated Logistics. After performing the order, Integrated Logistics sends a confirmation to GAC US. The communication passes through the headquarters in the US because the products stored in the warehouse are property of GAC US and stock modifications need to be processed by the financial systems due to the accounting regulations of Sarbanes-Oxley.

To realize the automated exchange of information, GAC employs human-based IOS-related resources that have a high degree of relationship-specificity. Employees and managers at each organization have accumulated substantial knowledge regarding the business partner to support the relationship and related information exchange. The setting of the relationship requires the workforces of both organizations to have frequent intensive communication. This is to ensure correct execution of the varied types of orders under the various conditions depicted by the market. This is exemplified in the cross-dock project that GAC initiated aiming at decreasing the minimum stocking period of products after arrival from the US. Prior to the project, the minimum period was 48 hours and the aim was to reduce it to 24 hours. As all changes in the inventory needed to be updated in both the GAC system based in the US and the IS of Integrated Logistics, the project required the collaboration of logistic executives and IT experts on both sides. It can be stated that almost all resources used by Integrated Logistics are relationship-specific as they have a dedicated site for GAC. More specifically, the human-based IOS-related resources are relationship-specific as the management and employees at different levels are specialized in servicing GAC. This is evident in the frequent meetings that occur between strategic, operational and IT executives of both organizations to discuss the various aspects of the relationship.

The communication between GAC and Integrated Logistics support various objectives. For the purposes on this study two objectives are highlighted: ensuring flawless interlinkage of processes and exchanging market information and knowledge. The flawless interlinkage of processes is essential for daily operations. All of the activities of GAC that require service parts or small products can be performed only when Integrated Logistics executes certain actions in the predetermined sequence

agreed upon by both parties. For example, when a sales agent of GAC confirms a sales order with a customer, GAC issues an order to Integrated Logistics to prepare the product for shipping. As Integrated Logistics prepares the product, GAC arranges for the product to be shipped to the customer; the product should then be shipped within hours after confirming the sales order to the customer. Accordingly there are more than 1000 orders daily. In case of interruptions, Integrated logistics discuss all details with GAC, including what items are being picked up, the quantities and exact time. These discussions allow both parties to manage the end-customers' orders and adjust the shipping schedule when needed. This intense collaboration is possible due to the tight coordination between internal processes and the processes of the partner. Accordingly, it is argued that GAC and Integrated Logistics have developed process-based IOS capabilities within the interorganizational relationship. The exchange of information and knowledge between organizations is conducted in order to realize two main aims. The market GAC is serving is volatile and has seasonal characteristics. Therefore, the IOS is used to exchange extensive information regarding past market trends and future forecasts. The IOS is also used to perform various types of market analyses and to communicate the results of these analyses between the partners. GAC can be limited in some of its activities by the abilities of Integrated Logistics. Accordingly GAC needs to have detailed information regarding Integrated Logistics' abilities and how it is planning to cope with the market changes. The exchange of market information is also beneficial for Integrated Logistics as it obtains future forecasts from its customer. The second aim of exchanging information is the improvement of the relationship. As the activities are tightly coupled across the organizations, realization of improvements is reliant on the cooperation of both organizations. To be able to design and plan any modifications, each organization needs to have in-depth knowledge about the activities conducted by the partner and the underlying reasons for performing these activities. The cross-dock project discussed earlier is an example of the need of having detailed information of both business and IT-related issues in order to realize modifications.

The relationship offers operational and strategic benefits for both GAC and Integrated Logistics. The intensive information exchange leads to lower transaction costs. This offers operational benefits including being able to meet the progressive cost targets and accurate forecasts. The better forecasts also improve employee productivity by enhancing the planning of working hours and ensuring the availability of capable employees. On a strategic level, GAC is able to offer more reliable and faster delivery of products to its customers in the EMEA region. The reliability of services and products is of essential importance in GAC's market. GAC is perceived as a successful player because it can realize high-quality performance consistently. For Integrated Logistics, the satisfaction of its customer has strategic importance. These benefits have eventually led to the extension of the contract and prolongation of the relationship.

#### *4.2.2 The relationship of Fretadia with Phoselot*

Phoselot is a large US-based organization that operates several types of large merchandise stores in North America. The merchandise stores consist mainly of discount stores and department stores selling everyday essentials and fashionable merchandise. The yearly revenue exceeds \$ 40 billion. The large diversity of merchandise results in a large number of suppliers. Phoselot demands from vendors to comply with rules and audits prescribed by the authorities as well as additional rules and audits set by Phoselot. Fretadia has been a supplier of Phoselot for the past four years. Fretadia is specialized in designing and manufacturing stylish home and bathroom accessories. It is based in the Netherlands. It has production facilities in Hong Kong and its yearly revenues exceed one million euros. Fretadia's customers consist mainly of retailers specialized in upscale stylish products.

Communication is conducted through an extranet that Phoselot has developed to facilitate interactions with its numerous suppliers. The system is linked with Phoselot's ERP system and provides plentiful up-to-date information and performance metrics such as previous and current stock levels, percentage of damaged products and future predictions. Phoselot also uses the system to perform reverse auctions whereby it only permits reliable suppliers to participate and subsequently displays its future procurement contracts for commodity products. The suppliers competitively bid for supplying the



product. As Phoselot determines most of the contract terms in advance, the main selection criterion is the price. The employment of human-based IOS-related resources is characterized with low relationship-specificity. There are no frequent meetings between employees and management of both organizations. There is also no need to have special experience or training to conduct communication. The human knowledge has a general and non relationship-specific nature. Managers of Phoselot offer Fretadia similar contract terms as the numerous other suppliers of Phoselot and the nature of products does not require specific domain knowledge. Managers of Fretadia rely mainly on general market information to maintain the relationship with Phoselot. The extranet transfers explicit codified information and such information is transferred without loss of integrity. The system is easy to use, and Phoselot provides support in case of technical problems.

The deliveries of stylish home and bathroom accessories by Fretadia to Phoselot occur on a regular basis. The orders are issued every week, and products are typically manufactured within two weeks and delivered to Phoselot's agent in Hong Kong. Subsequently, products are shipped to the US and arrive approximately four weeks later. The long time span between ordering and delivery in the US implies that short-term market fluctuations have to be absorbed by keeping a buffer stock. The existence of both the long time span and the buffer stock indicate that the functioning of the relationship is not realized through a tight interlinkage of processes. Therefore, we can argue that no process-based IOS capabilities exist within the relationship. Moreover, the stylish home and bathroom accessories have commodity characteristics and usually no significant changes occur to the products after the contracts have been fixed. The organizations have no need to exchange information regarding the latest customer preferences. The communication of large amounts of information through the IOS does not imply knowledge exchange or transfer. This is because both parties use the information to perform the current customer orders and do not utilize the information for long-term purposes. The information is collected by the ERP of Phoselot and is offered to Fretadia, but there is no enduring objective. Therefore, it is argued that no knowledge-based IOS capabilities exist within the relationship.

The benefits obtained from the relationship through the use of the IOS include only operational benefits. The communication of a large volume of information is not costly. Accordingly, Phoselot offers Fretadia ample information concerning the inventory levels, historical data and forecasts. The information includes the total inventory of the organization as well as detailed information per store. Fretadia utilizes only a minor part of the information received -- more particularly, the information regarding the new orders placed by Phoselot. This indicates that the IOS is used to increase the speed of order processing. However, the communication of ample information does not result in the attainment of strategic benefits such as enhancing the interorganizational relationship or better understanding of end-customer preferences. Further analysis of the information provided by the IOS may provide important insights and these insights can lead to strategic benefits. However, Fretadia does not conduct the analysis and no strategic benefits are obtained from information exchange. The findings of both case studies are summarized in table 1.

	<b>Case A</b> GAC and Integrated Logistics	<b>Case B</b> Fretadia and Phoselot
Relationship-specificity of human-based IOS-related resources	High	Low
Process-based IOS capabilities	Existing	Non existing
Knowledge-based IOS capabilities	Existing	Non existing
Operational benefits	High	High
Strategic benefits	High	Low

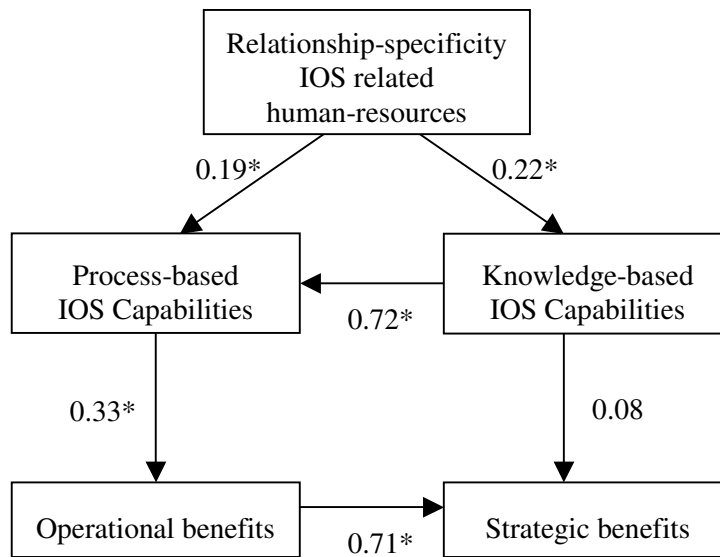
*Table 1. Summary of case study findings*

### 4.3 Field study

The objective of the field study is to allow for rigorous testing of the theoretical relationships between the constructs. The data of the field study is collected through a web survey. The sample frame of the survey contains Internet shops that are based in the Netherlands and sell computer related products. The questionnaire focuses on their relationship with their transportation companies. For each Internet shop, the relationship with its transportation company is important because products need to be delivered to customers in a timely and proficient manner. Some products require last minute modifications according to customer needs or on-site installation at the customer's location. These relationships are attractive for this study due to the extensive need for timely and reliable information and reliance on ICT. The Dutch transportation industry provides additional opportunity for this study due to the geographical location of the Netherlands in facilitating transportation and distribution to the European mainland, and due to the increased reliance on ICT to achieve timely communications across long distances. To ensure content validity Lawshe's (1975) quantitative approach is employed by asking a panel including ten experts in the transportation industry to indicate whether or not a measurement in a set of other measurement items is "essential" to the operationalization of each theoretical construct. Subsequently, a pretest is conducted on 20 companies to observe the reactions of respondents to the questionnaire under realistic conditions. To increase response rate, companies are offered to fill out a separate form to obtain a summary of the findings and to receive a benchmark of their answers with those from the entire sample. The number of valid responses is 137 (5 percent response rate). The sample consists mainly of small companies: 85.4 % have less than 10 employees. The companies sell multiple types of products including PCs/laptops (65.7%), PC spare parts/components (67.9%), software (60.6%) and PDA's and other handhelds (54.0%). We do not pretend to have a representative sample of all Internet shops in the Netherlands, as such a population is both ill-defined and very volatile. However, there is no reason to assume that the respondents deviate from the majority of Internet shops.

Structural equation modeling (SEM) is used for the data analysis as it allows the validation of the modified model including the multiple related equations simultaneously. LISREL is used as a SEM technique and it consists of two parts: the measurement model and the structural equation model. The measurement model identifies the relations between the observed measures, i.e. indicators, and their underlying latent constructs. The structural equation model identifies the causal relations between the constructs as put forward by the underlying theory. LISREL provides the opportunity to calculate the maximum likelihood estimates for both models, the measurement model and the structural equation model, simultaneously. However, it is recommended that the measurement model is calculated and fixed before the structural model is estimated (Gerbing & Anderson, 1988; Gefen et al., 2003). Our study follows this two-stage approach.

The aim of the first step is to establish the convergent and discriminant validity of the constructs. This is done using LISREL confirmatory factor analysis (CFA). The CFA shows acceptable model fit. The  $\chi^2$  of 140.80 with 94 degrees of freedom is a  $\chi^2$  to df ratio of less than the recommended 1:3. The AGFI at 0.83, the CFI at 0.95, the RMR at 0.047, and the RMSEA at 0.061 are all within acceptable limits for CFA, except for the GFI at 0.89 and the NFI at 0.89 are slightly below the 0.9 thresholds. Next, all of the hypothesized propositions are simultaneously tested by means of examining the structural model. The fit measures are acceptable: the chi-squared is 148.48 with 98 degrees of freedom. The AGFI at 0.83, the CFI at 0.95, the RMR at 0.067, and the RMSEA at 0.062 are within acceptable limits, except for the GFI at 0.88 and NFI at 0.89. Figure 2 shows the standardized LISREL path coefficients.



\* path is significant at the .01 level

Figure 2. Standardized LISREL solution

#### 4.4 Results

The empirical data show support for both hypotheses 1a and 1b. In both case studies and the field study, the high relationship-specificity of human-based IOS related resources support the existence of process-based and knowledge-based IOS capabilities. The successful execution of orders and the successful transfer of information are supported by relationship-specific human efforts such the frequent meetings between employees of both organizations. The empirical data show also support for hypothesis 2a. The existence of knowledge-based IOS capabilities supports the existence of process-based IOS capabilities. The sharing of information and knowledge is thus found to support the successful interlinkage of business processes. However, the empirical data does not show undisputed support for hypotheses 2b, 3 and 4. The findings of the case studies show that knowledge-based IOS capabilities positively affect the attainment of strategic benefits, but the data of the field study reveal that even though the support is positive, it is not significant. The case study on the relationship between GAC and integrated logistics and the field study support hypotheses 3 and 4. The successful interlinkage of business processes is found to support the attainment of operational benefits and subsequently the operational benefits coincide with the existence of strategic benefits. However, the data of the case study on the relationship between Fretadia and Phoselot show that even though process-based IOS capabilities do not exist, operational benefits can be obtained within the IOR. It can be argued that in that particular case, the operational benefits are obtained from other activities. Moreover, the operational benefits in that particular relationship do not lead to the attainment of strategic benefits. Table 2 provides a summary of the findings.

## 5 DISCUSSION

This study uses the resource-based view to establish a conceptual model that describes the influences of the relationship-specificity of human-based IOS related resources on the existence of IOS capabilities and subsequently the attainment of benefits. The findings indicate that human skills and human interactions are important for the cross-organizational interlinkage of business processes. At the operational level, the interlinkage of business processes lead to various benefits including the decrease of transaction costs, rapid processing of customer orders and increasing productivity.

	Case A	Case B	Field study
Hypothesis 1a	Supported	Supported	Supported
Hypothesis 1b	Supported	Supported	Supported
Hypothesis 2a	Supported	Supported	Supported
Hypothesis 2b	Supported	Supported	Not supported
Hypothesis 3	Supported	Not supported	Supported
Hypothesis 4	Supported	Not supported	Supported

Table 2. Summary of the empirical findings on the conceptual model

Even though the empirical data does not provide undisputed support, however, there is strong evidence from the field study that these operational benefits coincide with strategic benefits. The findings also indicate that human skills and interaction are important for cross-organizational transfer of knowledge. The interlinkage of processes across organizations can be sensitive to environmental changes. Employees and managers of both organizations are able to notice these changes. Similarly, cross-organizational meetings and discussions between employees and managers facilitate sharing of knowledge. Frequent meetings enable the sharing of experiences and points of view regarding current issues. The findings also show that transfer of knowledge facilitates interlinkage of business processes and attainment of strategic benefits. Sharing of information enhances the knowledge within each organization regarding the abilities of the business partner and hence improves execution of cross-organizational processes. In addition sharing of information can produce current and up-to-date information regarding the environment, understanding market developments and creating new business opportunities. These improvements lead to competitive advantages and strategic benefits.

## 6 CONCLUSION

Human cognitive and social skills are essential for the success of interorganizational relationships. The objective of this study is to increase the understanding of how human efforts influence the use of IOSs and the consequent influences of IOS on performance. This paper presented a conceptual model that argues for positive influences of employees and managers on two particular cross-organizational activities – business-processes interlinkage and knowledge transfer-- and subsequent positive influences of these activities on operational and strategic benefits. The conceptual model supports the notion of complementarity of transaction-cost and resource-based perspectives. The empirical findings provide strong undisputed support for most of the hypotheses of the conceptual model, however some hypotheses do not obtain undisputed empirical support. Future research can explore whether additional contextual conditions affect the influences of knowledge-based IOS capabilities on the attainment of strategic benefits. Furthermore, the positive relationship between operational and strategic benefits is not supported by some empirical data. Longitudinal research designs can enable the attainment of more accurate insights on the influences of IOS capabilities on operational and strategic benefits.

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