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Exploring Factors Affecting the Achievement of Different Types of Inter-Organisational Systems (IOS) Benefits

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Abstract

The adoption of inter-organisational system (IOS) has become important for many organisations to increase the efficiency of their business operations and to stay competitive. IOS adoption offers significant benefits to organisations at various levels including operational, tactical and strategic levels. While previous studies have identified a number of factors that affect the achievement of IOS benefits by organisations, little is known about the relationships between these factors to the achievement of different types of IOS benefits. In this study, we use two case studies in large Australian pharmaceutical and grocery manufacturing companies to demonstrate that there is a relationship between factors and types of benefit. A number of propositions are developed to guide further research.

Keywords: inter-organisational systems (IOS), IOS benefits, factors, case study, Australia

1. Introduction

Inter-organisational systems (IOS) are important information technology (IT)-enabled business initiatives that support key boundary-spanning activities of organisations. These systems form the foundation of business-to-business e-commerce operations due to their ability to facilitate exchange of information between trading partners along supply chains (Senn 1996). IOS thus enhance organisational efficiency (Kaefer and Bendoly 2000), improve quality and timeliness of information (Silverman 1990), and even enable entire supply chains to reduce wasteful inventories by reacting more effectively to customer demand and jointly planning product introductions and promotions (Soliman and Janz 2004). This, in turn, greatly improves relationships with business partners (May 2000). IOS also bring significant competitive advantage to organisations by increasing their bargaining power and by raising the switching costs of trading partners (Johnston and Vitale 1988).

The IOS literature has identified that different organisations experience different benefits as a result of IOS introduction. The various benefits of IOS adoption are typically classified into three categories: operational, tactical and strategic benefits. In addition, a range of organisational, innovation related, and environmental factors that affect the attainment of benefits from the introduction of IOS have also been recognised (Kurnia and Johnston 2001; Lee and Lee 2000; Lee and Lim 2003). However, there is still limited

understanding of the relationship between factors affecting IOS benefits and the achievement of specific types of IOS benefits (operational, tactical and strategic benefits). To address this gap in the literature, this paper aims to explore the relationship between various factors identified from the literature which affect the achievement of IOS benefits and the types of benefits gained by organisations. For this purpose, we reanalysed two case studies conducted with a pharmaceutical manufacturing company (Rahim et al. 2001) and a grocery manufacturing company (Kurnia and Johnston 2001). The pharmaceutical company introduced an EDI enabled e-procurement initiative and the grocery manufacturing company introduced Category Management (CM) as part of the Efficient Consumer Response (ECR) initiative. Both CM and ECR are typical examples of IOS since these business initiatives span organisational boundaries and are supported by advanced information technologies. The pharmaceutical company did not experience the expected benefits from its e-procurement initiative which were explained in terms of the absence of a number of critical factors. In contrast, the grocery company was found to have experienced a number of benefits from the use of ECR initiative and those factors that had facilitated the attainment of its benefits were identified. Drawing upon a qualitative analysis that involved comparing the contrasting evidence from these two companies analysing with the existing literature, we find that certain types of benefits are associated with particular factors. These relationships are then expressed as three propositions, to be tested in future studies.

The findings of this study enrich existing studies of IOS by providing a better understanding of what factors lead to the achievement of operational, tactical and strategic benefits of IOS. They are also useful to IT managers who are responsible for formulating appropriate strategies required for promoting IOS in their organisations and managing expectations of senior management and users alike about the benefits to be gained from IOS adoption.

The rest of the paper is structured as follows. The following section provides a critical review of the existing literature on IOS benefits and factors affecting the achievement of IOS benefits. A brief description of the research methodology and a summary of the profiles of the case companies are then presented. A description of the context of IOS adoption and the benefits experienced is then outlined for each case, followed by a discussion of the findings in relation to the relationships between factors affecting IOS adoption and the type of the benefits experienced. Finally, conclusions are drawn and some opportunities for future studies are highlighted.

2. Literature Review

There exists considerable literature on the benefits of IOS adoption which generally categorises various IOS benefits into three groups: operational, tactical, and strategic. Operational benefits refer to the efficiency improvements made to the internal functioning of an organisation (Banerjee and Golhar 1994). They typically include reduced paper work, fewer data entry errors, reduced manpower, and reduced inventory (Johnston and Gregor 2000). Tactical benefits refer to those that enable managers to perform their functions more effectively by analysing quality information at the right time (Murphy and Daley 1998). Typical tactical benefits include improved quality of information, the ability of managers to access information quickly, and greater ability of managers to make better decisions (Murphy and Daley 1998). Strategic benefits result

from the development of corporate strategies to gain competitive advantage and to increase market-share through strengthening close relationships with trading partners (Reekers and Smithson 1994).

Previous literature on IOS adoption benefits can be divided into two broad streams: descriptive IOS studies and factor-based research. The former stream dominates the IOS benefits literature. In general, these studies illustrate benefits gained by organisations as a result of IOS introduction using either descriptive case studies or surveys (e.g. (Chen and Williams 1998; Spinardi et al. 1997; Stank et al. 1999). This first research stream provides some descriptions of the IOS benefits obtained but does not assess factors that may lead to the achievement of the benefits.

Another stream of research has tested the influence of several factors (chosen from the innovation and organisational behaviour literature) to explain variations in IOS benefits. The works of Lim and Palvia (1996), Kurnia and Johnston (2000) and Lee and Lee (2000) represent this group of studies. A summary of these studies is shown in Table 1. The most commonly cited factors in these studies include *senior management support*, *IOS integration*, *IOS transaction ratio*, *IOS enabled process change* and *cooperation from business partners*. Each of these factors is defined and briefly described below in Table 1.

Senior Management Support

Support from senior management is essential to ensure benefits from IOS (Kurnia and Johnston 2000). Organisations in which senior management commitment to IOS are high generally allocate sufficient amount of financial and manpower resources to support integration and business changes required in IOS adoption. Management support is also strongly needed to persuade business partners to embrace IOS and make necessary changes in the inter-organisational work flows (Mackay and Rosier 1996).

IOS Integration

IOS integration is defined as seamless electronic exchange of data between IOS and back-end operational applications such as inventory systems and purchasing management systems.. As a result of the integration, human intervention is not required for entering transaction data which in turn improves data accuracy, reduces paperwork, and enhances the quality of decisions due to quicker availability of timely information (Mackay and Rosier 1996)

IOS Transaction Ratio

IOS transaction ratio refers to the percentage of transactions an organisation conducts electronically through the IOS in place. Organisations with greater IOS transaction ratio are more likely to receive such operational benefits as improved data accuracy, reduced paperwork, and reduced labour to support business transactions (Kurnia and Johnston 2000).

IOS Enabled Process Change

The benefits from IOS can also be affected by the inefficiency inherent in the existing inter-organisational business processes. By introducing direct computer-to-computer communications facilitated by EDI between supply chain members to eliminate the efficiency involved in paper-based systems, organisations are likely gain significant benefits of Just-In-Time (JIT) based supply chain management initiative (Arunachalam 1995).

Cooperation from Business Partners

Cooperation from business partners refers to the willingness of trading partners to work together to implement IOS. IOS affects inter-organisational work processes and without active support from the trading partners, it would not be possible to bring any improvement in work processes. The benefits of IOS would flow when business partners are willing to establish procedures and adjustments in inter-organisational work processes (Karonis 1997).

This second research stream has produced some inconsistencies in findings. For instance, 'management support' has been reported to be a strong predictor of EDI-enabled e-procurement systems benefits (Bergeron and Raymond 1992). On the other hand, Mackay and Rosier (1996) found insignificant effect of management support on benefits arising from EDI enabled e-procurement systems adoption. In addition, none of these previous studies investigated the relationships between factors affecting IOS benefits and the achievement of specific types of benefits (operational, tactical and strategic). This gap has motivated us to reanalyse our previous case studies to investigate the relationships between these five factors and the types of benefits experienced by the case study participants.

3. The Research Method

A number of case studies within the Australian pharmaceutical and grocery industries were conducted by the authors to understand the IOS adoption in 2001 and 2000, respectively (Kurnia and Johnston 2000; Rahim et al. 2001). In this study, we reanalysed a case from each industry to examine the existence of the five factors identified above and the relationships between these factors and the achievement of the benefits by the case companies. A case study approach was appropriate to address the research objective because it provided a good understanding of the IOS adoption context of the case study participants. In this preliminary study, two cases which reflect contrasting situations of IOS benefits were selected based on the principle of theoretical replication (Yin 1994), to illustrate the relationships between a set of particular factors and the achievement of specific benefits by the organisations through IOS adoption. In one case (i.e. pharmaceutical company), little benefits were reported which were attributed to the lack of certain success factors. On the other hand, in other case (i.e. grocery company), the benefits were explained in terms of the presence of success factors.

In each case study, several in-depth interviews were conducted to explore the organisations experience with the IOS adoption. The interviewees granted access to documents relating to the company background and IOS profile, which helped the researchers to corroborate the information provided during interviews. The interview transcripts as well as a draft report on IOS adoption were prepared and were sent to the interviewees for review. Data collected from these previous case studies enabled us to examine the relationships between factors affecting IOS adoption and the types of benefits experienced.

Table 1: A summary of the findings obtained from factor-based studies focusing on IOS benefits

Studies	Significant factors	Dependent Variable	Type of Benefits Experienced by Organisations		
			Operational	Tactical	Strategic
(Bergeron and Raymond 1992)	- Management support - EDI integration - Imposition by partners	Benefits of EDI-enabled e-procurement systems	- Cost paperwork costs -Reduced manpower costs	- Improved information quality	- Increased competitive advantage
(Lim and Palvia 1996)	- EDI integration	Customer service offered by EDI-enabled electronic systems	Not reported	Improved information on distribution system	-improved customer service
(Mackay and Rosier 1996)	- Organisation size - Management support - EDI Integration	Benefits of EDI-enabled e-procurement systems	- Clerical staff savings - Increased data accuracy	Not reported	-Improved customer relationship - better customer service
(Lee and Lee 2000)	- Management support - Transaction climate - Government support - Dependence	Benefits of EDI-enabled e-procurement systems	- Reduced inventory - Reduced transaction costs	- Higher quality information	-Improved customer relationship - better customer service - Increased competitive advantage
(Lee and Lim 2003)	- Trust - Dependence - Management support - EDI integration	Performance of EDI-enabled e-procurement systems	-Increased data accuracy	Not reported	Improved relationship
(Kurnia and Johnston 2000)	-Top management commitment -Clear vision -IT Education level -Partnership and trust with trading partners -IOS transaction volume	ECR satisfaction	- Reduced inventory and out of stock - Reduced transaction costs - Improved labour productivity	- better information about consumer demand (for inventory and promotion)	- improved customer satisfaction

4. Description of Cases

Case studies from two large Australian manufacturing companies in the pharmaceutical and retail industry sectors were reanalysed in this study. Case A is a pharmaceutical manufacturing company that specialises in the development and manufacturing of biologically based health care products which are sold through several wholesalers. The company currently has 600 employees and their sales revenue was over A\$170 million dollars in 2000. This company has embraced an electronic order receiving initiative which is supported by PC-based standalone EDI technology. The ordering system is used to receive purchase orders directly from a large pharmaceutical wholesaling company and send back confirmation. Once the purchase orders are received via EDI, they are then typed in manually and are fed into the company's internal information system. The EDI messages are sent by the wholesaler through a network services provider enabling the pharmaceutical company to download purchase orders from its mail boxes. Currently, the pharmaceutical company receives about five purchase orders a day, but they involve a huge volume of sales.

Case B is a food and grocery manufacturing company which is one of the leading food and grocery manufacturers in Australia. The company operates in approximately 80 countries, employing approximately 300,000 employees, with an average turnover of AU\$60 billion. The company manufactures several major product categories, with its businesses broken into strategic business units. It has been practising the Category Management (CM) program with two major retailers since the late 1990s. CM is an interactive business process between manufacturers and retailers to manage product categories as strategic business units (Dupre and Gruen 2004). In support of CM and other business initiatives proposed by ECR, the company has also established an EDI connection with the two retailers using a third party network. EDI is used to receive purchase orders from the major retailers and to send purchase order acknowledgement and advanced shipping notice. With one of the retailers, the EDI system is also used for receiving the point-of-sales (POS) data for all product categories supplied by this company on a weekly basis. This allows the manufacturer to optimise its product range and evaluate promotions and new product introduction efficiently.

5. The Findings

5.1 Case A: EDI Adoption in a Pharmaceutical Company

Context of IOS Adoption

In this first case, the manufacturing company received initial support from its senior management for investing in EDI as a technological solution to establish an electronic relationship with the customer. However, senior management did not see much economic value obtained from the electronic relationship and hence did not authorise any more resources to use the electronic order receiving system for strategic purposes.

The company did not take any initiative to integrate the EDI enabled electronic order receiving system with its back-end BPCS ERP system. It introduced a standalone EDI application which allowed the wholesaler to send purchase orders to the company in EDI format. The company then printed those orders in hard copy and customer service staff re-entered them into the ERP system. The company estimated that it would require approximately \$150,000 to establish integration with their back-end ERP system.

However, senior management were reluctant to invest such an amount primarily because of its low transaction ratio and perceived lack of economic value.

The company did not incorporate any major change in any part of their business processes as a result of introducing the electronic ordering receiving system. This was because the changes would only come about once EDI was integrated with the back-end ERP system. Moreover, senior management did not give priority to any process changes because it was not seen as a strategic application.

The electronic order receiving system was used by only one customer company which placed only two purchase orders a day. Thus, the frequency of electronic transactions is very low and there is no plan to extend its use. The pharmaceutical company did not take any initiative to extend this system to other customers. The company did not receive any significant cooperation from the customer that requested electronic connectivity and was reluctant to share data, as revealed by the business manager:

“At the moment, the wholesaler does not share their forecasting information with us. I suppose due to our senior management’s lack of interest nobody from our company approached the wholesaler to share forecasting information with us. I guess that there is a feeling in our company that the customers are very reluctant to share their market forecasts with us. I think more cooperation at a higher level is necessary to persuade them to give us forecasting.”

Benefits of IOS Adoption

The company in Case A did not experience any savings in paper work because the EDI enabled electronic ordering and receiving system was not integrated with its back-end ERP system. The company printed out the customer orders which were received as EDI messages and then manually entered them into the ERP system. No initiatives were undertaken to produce electronic invoices. Furthermore, the electronic order receiving system was being used with only one customer company that placed only two purchase orders a day. Thus, the frequency of electronic transactions was very low. The lack of integration between the back-end ERP system and the electronic order receiving system also meant that no improvement in data accuracy was experienced by the company.

The electronic order receiving system did not lead to a reduction in inventory holdings. No one from the company took any initiative to extend EDI to planning activities for forecasting demand and sharing that information between the customer and the company. Furthermore, the system did not contribute to a reduction in customer service staff. EDI transactions accounted for 15% of the total business transactions which is not sufficient to attract a reduction in customer service people. The company thus demonstrated the need to optimise a large portion of its orders before it could gain any savings in manpower.

The company did not have direct access to its customers’ inventory systems. Hence, the company did not know how much of its products the customer was holding. This problem was expressed by the business manager as follows:

“Our ability to make improved decisions to manage our inventory still remains unaffected by EDI. This is because we don’t have a direct access to the stock status of the wholesaler. I think it is important for us and for them to gain direct access to each others inventory holdings, because it will help us to decide how to reduce

inventory stock along the supply chains. But no body took any initiative.”

The company introduced a standalone EDI to develop its electronic order receiving capability but due to lack of management initiative did not use the technology extensively and thus failed to gain any competitive advantage. The electronic order receiving system also did not help the company in increasing its sales but its compliance with the customer's request to develop an electronic relationship protected the company from any possible diminishment of sales.

5.2 Case B: Category Management Adoption in a Grocery Manufacturing Company

Context of IOS Adoption

The grocery manufacturing company had been practising a Category Management (CM) program with two major retailers for over 5 years. In late 1990s, the company was approached by a large retailer chain to participate in a CM program which was supported by a suitable e-commerce technology infrastructure. Senior management understood the economic significance of embracing the CM initiative and decided to participate in the program by utilising the technological novelty of EDI and the EANnet for online exchange of product information between trading partners. In this case, CM is considered as the IOS adopted by the participant.

Senior management of the company offered strong support for the introduction of the CM initiative. CM requires an electronic commerce infrastructure to allow for timely information to flow correctly and accurately between trading partners. Due to strong management support, the company successfully invested in the EDI system and other required IT infrastructure to implement the CM program. The company integrated the e-commerce technology (i.e. EDI) with its back-end IT applications in order to eliminate the need for manual intervention in handling the business transactions needed to support the CM initiative.

CM requires a willingness to change business culture and work practices (Dupre and Gruen 2004). The grocery company and its retailers both altered their inter-organisational workflows and changed their culture in terms of establishing a stronger partnership arrangement. Senior management of the grocery company understood the possible economic impact of embracing the CM initiative and provided full support in restructuring their business to work closely with the retailers.

The CM initiative supported a low proportion of the IOS transactions of the grocery company because it was being trialled with a number of product categories only. However, the company had plans to extend it to other product categories. In order to succeed, the CM initiative clearly required effective information sharing between the grocery manufacturing company and the retailers which, in turn, depended on enhanced mutual trust and cooperation among supply chain trading partners. According to the customer development manager, in the past, Australian retailers used to be very non-cooperative in terms of information sharing with manufacturers. However, the attitude has changed as the result of a better understanding of the CM initiative. According to the customer development manager:

“At this point in time, there are very few companies involved in Category Management {Retailer 1} has become very collaborative and open ...

{Retailer 2} has become very committed and lots of cooperative work have been done ...”.

The CM initiative encouraged the company to engage in buyer/supplier exchange programs that were concerned with exchanging staff between the manufacturer and the retailers for a certain period of time. The purpose of such programs was to bolster trust and cooperation between supply chain members by enhancing understanding of what business partners within a supply chain were doing.

Additionally, the CM initiative encouraged one of the retailers to provide the grocery company with point-of-sale (POS) data for all categories supplied on a weekly basis via EDI, allowing the grocery company to optimise its product range and evaluate promotions and new product introductions efficiently.

Benefits of IOS Adoption

The grocery company established a seamless integration between the EDI system supporting the CM initiative and its internal IT systems. It was thus able to receive purchase orders from and send purchase order acknowledgments and Advance Shipping Notices via EDI to two retailers. The company was also capable of using the EANnet provided by EAN Australia (now called GS1) to allow secure, on-line exchange of product information between trading partners. As a result, business transactions were completed more quickly with a high level of accuracy. Furthermore, as the EDI system was fully integrated, the company eliminated the need for printing hard copies of transactions and thus experienced a reduction in paperwork.

The consumer demand transparency obtained through POS data sharing enabled the company to make better decisions regarding product range optimisation, promotion and new product introduction. This, in turn, brought a reduction in inventory holdings since the company could better predict consumers demand and understand their preference based on the POS data. Human intervention, however, was still required for printing and processing business transactions with independent retailers and no manpower reduction was experienced.

Senior management support was helpful in obtaining trust and greater cooperation from the retailers. The company obtained the POS data for all product categories that it supplied to one major retailer via the EDI system. This enabled the company to make better decisions concerning inventory as demand information for each product category was obtained in a timely way. The CM initiative, however, did not permit the company to establish access to retailers' internal inventory databases. The retailers only transferred POS data of the company's products from their internal systems.

In terms of strategic benefits, the grocery company began to enjoy improved relationships with retailers, which was possible due to greater trust and cooperation secured through embracing the EDI-enabled CM initiative. However, no evidence was found in support of it having obtained a greater market share and increased competitive position of the company in the industry.

6. Discussion

Each of the two cases described above illustrates an extreme case in relation to the five factors affecting IOS benefits. In the pharmaceutical manufacturing company, there was a lack of senior management commitment in IOS adoption. Senior management did not want to invest monetary and human resources into integrating the EDI system with its

back-end ERP system and was reluctant to improve transaction volume. As a result, no process changes were introduced and the company did not obtain any cooperation from the customers to share information and extend the electronic relationships to other business functions. On the other hand, senior management in the grocery company wanted to use the EDI-based CM initiative to attract economic gains and hence they consciously followed an IOS adoption approach that aimed to secure greater cooperation from the business partners. With strong commitment from senior management and good cooperation with the two major retailers, changes in inter-organisational culture, mindset, and work practices were possible. Senior management in the grocery company realised that the expected economic gains could only be realised when they invest in IOS integration and raise IOS transaction volume. Hence, they did not hesitate to invest necessary resources for IOS integration. Table 2 summarises the presence or absence of the factors affecting the attainment of IOS benefits cited in previous literature for both participating companies.

Table 2: Factors affecting IOS benefits in case companies

Factors	Cases	
	Pharmaceutical	Grocery
Management support	Some for establishing electronic connectivity but none for using system effectively	High level of management support was present
IOS integration	Not performed	Performed
IOS transaction ratio	Very low	Medium
IOS enabled process changes	No changes were introduced	Changes in business culture and work practices were introduced
Cooperation from business partners	No initiative was undertaken by the senior management to secure useful cooperation from the customer	Cooperation from business partners was received

Differences in the factors present in the IOS adoption initiatives of the two companies affect the benefits gained by the organisations. The pharmaceutical company did not receive any operational or tactical benefits as a result of introducing the electronic order receiving system mainly due to a lack of management support and IOS integration. It did, however, experience an improvement in relationships with customers that requested electronic connectivity. Interestingly, although the improved relationship protected the existing level of sales, it neither invited more sales for the company nor improved its competitive position. In contrast, some operational and tactical benefits were experienced by the grocery company due to the presence of management support and the level of IOS integration. Similar to the pharmaceutical company, the grocery company also experienced an improvement in its relationship with the two retailers that initiated the CM initiative. However, by embracing the CM initiative, the grocery company neither advanced its competitive position in the industry nor attracted greater sales orders, although its existing sales were protected through the cooperation with the retailers. With a higher IOS transaction ratio, a higher level of trust, and better security arrangements in place between the company and the retailers, the company might gain access to retailers' systems and gain competitive advantage in a long run. The benefits experienced by the two companies and factors affecting the attainment of these benefits are summarised in Table 3.

Table 3: Summary of IOS benefits and factors affecting their achievement in case companies

IOS Benefits	Pharmaceutical Company		Grocery Company	
	Benefits Experienced	Relevant Factors	Benefits Experienced	Relevant Factors
Operational Benefits				
Greater accuracy	No effect on accuracy	Lack of IOS integration	Improved transaction accuracy	IOS integration, management support
Reduced paperwork	No effect on paperwork	Lack of IOS integration, Low IOS transaction, Lack of management support	Savings in paperwork	IOS integration, sharing of POS data secured through trading partner cooperation
Reduced inventory	No effect on inventory situation	Lack of management support	Reduced inventory	Improved decision making due to sharing of POS data secured through trading partner cooperation
Manpower savings	No effect on manpower status	Low IOS transaction	No effect on manpower status	Low IOS transaction
Tactical Benefits				
Quick access to partner's IS	No access was secured	Lack of management support	No access	Lack of trust, Security issues
Improved decision making	No effect on decision making	Lack of management support	Sharing of POS data improved decision making	Management support, cooperation from business partners
Strategic Benefits				
Competitive advantage	No effect on competitive advantage	Lack of management support for innovative use of EDI	No effect on competitive advantage	Low IOS transaction ratio
Greater sales	Protected against diminishment of existing sales	Other factors like better marketing campaigns	Protected against diminishment of existing sales	Cooperation with trading partners
Improved relationship	Better relationship	Management support	Better relationship	Management support, process change, greater cooperation with business partners

Further analysis revealed that the types of benefits (operational, tactical or strategic) obtained by each case company are influenced by the presence/absence of a particular factor. For instance, the case studies demonstrate that IOS integration and securing greater collaboration from business partners facilitated exchange of useful information which together improved data accuracy and brought in a reduction in paperwork and inventory holdings. However, manpower savings, for example, was not achieved in either case because of the low volume of IOS transactions which was not surprising as the IOS adoption was still in its infancy. Once these companies established IOS relationships with a majority of business partners, then a decrease in manpower associated with processing customer orders was likely to be achieved. Thus it appears that operational benefits were affected by the presence of management support, IOS integration, IOS transaction ration and cooperation with trading partners.

Moreover, tactical benefits including making better decisions were achieved when management support was strong and management succeeded in accessing useful and

timely information secured through greater collaboration. Two factors appeared to influence the achievement of tactical benefits in both cases namely management support and cooperation from trading partners. The only strategic benefit experienced by the case study participants was an improvement in trading partner relationships which was possible due to top management's support for the introduction of IOS and the business process changes introduced. Interestingly, none of the factors were found to have directly contributed to attracting greater sales or enhancing the competitive position of the companies. Thus, it appears that the presence of management support, IOS transaction ratio, process change and cooperation from trading partner has allowed both case companies to gain some strategic benefits of IOS adoption. Table 4 summarised the influence of each factor on the achievement of IOS benefits experienced by the case companies.

Table 4: The relationship between factors affecting IOS benefits and the types of benefits achieved by case companies

Types of Benefits	Operational	Tactical	Strategic
Factors			
Management support	x	x	X
IOS integration	x		
IOS transaction ratio	x		X
IOS enabled process changes			X
Cooperation from business partners	x	x	x

Accordingly, on the basis of the contrasting evidence gathered from two cases which represent extreme situations of IOS adoption benefits, the following three propositions are suggested:

H1: Top management support, IOS integration, IOS transaction ratio and cooperation from business partners will increase the likelihood of achieving operational benefits of IOS.

H2: Management support and cooperation from business partners will increase the likelihood of achieving tactical benefits of IOS.

H3: Management support, IOS transaction ratio, process change and cooperation from business partners will increase the likelihood of achieving strategic benefits of IOS.

7. Conclusion

In this study we used data collected from previous case studies conducted with one pharmaceutical manufacturing company and one grocery manufacturing company regarding the adoption of an EDI enabled e-procurement system and a CM initiative. We explored the experience of the case companies in achieving three types of IOS benefits and examined the influences of a set of factors identified from the literature on the specific types IOS benefits achieved by each case company.

We found evidence to suggest that these various factors have different effects on the achievement of operational, tactical and strategic benefits of IOS and formulated three propositions to express the relationships between factors affecting IOS benefits and the types of benefits achieved. Since most studies of IOS adoption benefits have only explored factors leading to the achievement of IOS benefits in general, understanding of how these various factors affect the achievement of the different types of benefits obtained in this study offers additional insights for both practitioners and researchers. A

limitation in this study is that we only used two case studies and no evidence has emerged from these cases to suggest the existence of any new factors which were not mentioned in the literature. Thus, further studies are needed to explore this issue. Further multiple case studies of various organisations in different industry sectors are required to explore in more detail the relationship between factors and benefits achieved and test the three propositions formulated above. This should be followed by a survey involving a large number of organisations in different industry sectors to further strengthen the findings and support generalisation of the outcomes.

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