

MASTER'S THESIS

Improving Business by Integrating the Procurement Process

HENRIK HAGELBERG
HENRIK JOHANSSON

MASTER OF SCIENCE PROGRAMME

Department of Business Administration and Social Science
Division of Industrial Marketing and e-Commerce

ACKNOWLEDGEMENTS

Our first contact with the area of research was taken early in the spring of 2003. During a project course about e-business strategies we were asked to write a case study about a company conducting e-business in some way. Through eMarket Services we came in contact with Endorsia.com International AB and were given the opportunity to interview the Financial Director, Per Svensson. During the case study we learned a lot about the company and the challenges it was facing. We realised it would be exciting from both an academic and business perspective to continue the research in our master's thesis.

The master's thesis was written during a 20 week period from September 2003 to January 2004. It was written in the e-MBA program at the division of Industrial Marketing and e-Commerce at Luleå University of Technology. The study has given us a good understanding of the problems and opportunities that small and medium sized distributors face when integrating the supply chain but also e-business in general.

First of all we would very much like to mention our two supervisors, Sven-Olof Husmark from Endorsia.com International AB and Lennart Persson at the University. We would like to thank Sven-Olof for always being obliging and helpful and Lennart for his constructive feedback. Their apparent belief in our ability has encouraged us to aim higher. We would also like to thank the rest of the workforce at Endorsia.com International AB. You made the hard work much easier many times. A grateful thought is also sent to all our respondents. Your time and effort have really been appreciated.

Finally, the love and support from friends and family must not be forgotten. Whether you are in Växjö, Jönköping, Huskvarna, Luleå, Göteborg or someplace else, your imprints on our thesis are probably bigger than you imagine. Thank you!

Göteborg, January 2004

Henrik Hagelberg Henrik Johansson

ABSTRACT

Much of managers' attention when it comes to increasing the organisational effectiveness has today turned from an intra-enterprise focus towards an inter-enterprise focus. Managers have realized that the integration and coordination of for instance procurement activities can give significant benefits. Previously EDI have been the most important information communication vehicle but the Internet is being used more and more. This thesis focuses on the problems and opportunities that distributors' of industrial goods and services may experience if they decide to integrate their procurement processes with their suppliers via the Internet. We intend to examine which the driving and inhibiting factors are as well as their impact on the distributor's decision to integrate with the supplier or not. To reach our objective we have conducted a multiple case study of five distributors in the industrial supply sector. Our study shows that drivers of integration are first of all efficiency improvements. Strategic benefits do not drive the development to the same extent since they are hard to concrete. The most important inhibitors include incompatibility between different systems and formats and cultural factors.

Keywords: e-business, integration, application integration, supply chain, benefits, barriers, e-procurement, distributor

TABLE OF CONTENTS

1 PROBLEM AREA.....	1
1.1 Introduction.....	1
1.2 Background.....	2
1.2.1 <i>Integration</i>	2
1.2.2 <i>Integration enablers</i>	3
1.3 Problem discussion.....	4
1.4 Purpose.....	6
1.5 Delimitations.....	6
2 LITERATURE REVIEW.....	7
2.1 Integration development: A stage model.....	7
2.2 Enabling technologies.....	9
2.2.1 <i>Electronic data interchange</i>	9
2.2.2 <i>The Internet and XML</i>	9
2.2.3 <i>Application integration</i>	10
2.3 e-Procurement.....	11
2.3.1 <i>Buying centre characteristics</i>	11
2.3.2 <i>The buying centre processes</i>	13
2.3.3 <i>Impact on outcomes</i>	15
2.4 Drivers of integration.....	15
2.4.1 <i>Operational drivers</i>	15
2.4.2 <i>Strategic drivers</i>	16
2.4.3 <i>External forces</i>	17
2.5 Inhibitors to integration.....	17
2.5.1 <i>Technical issues</i>	17
2.5.2 <i>Legal issues</i>	18
2.5.3 <i>Business relationship issues</i>	18
2.5.4 <i>Cultural issues</i>	18
2.5.5 <i>Human resource management issues</i>	19
2.5.6 <i>Issues regarding perceived costs and benefits</i>	19
3 CONCEPTUALISATION AND FRAME OF REFERENCE.....	21
3.1 Conceptualisation and operationalisation.....	21
3.2 Emerged frame of reference.....	23
4 METHODOLOGY.....	24
4.1 Research purpose.....	24
4.2 Research approach.....	25
4.3 Research strategy.....	25
4.4 Sample selection.....	26
4.4.1 <i>G.A. Lindberg AB</i>	27
4.4.2 <i>Momentum Industrial Maintenance Supply AB</i>	27
4.4.3 <i>AB Sverull</i>	28
4.4.4 <i>Ravema AB</i>	28
4.4.5 <i>AB Östergötlands Maskinaffär</i>	28
4.5 Data collection methods.....	28
4.6 Data analysis.....	31
4.7 Quality standards.....	31
4.7.1 <i>Validity</i>	32
4.7.2 <i>Reliability</i>	32
4.8 Critique of methodology.....	32
5 DATA PRESENTATION AND ANALYSES.....	35
5.1 G.A. Lindberg AB.....	35

5.1.1 Drivers of integration.....	35
5.1.2 Inhibitors to integration.....	38
5.2 Momentum Industrial Maintenance Supply AB.....	40
5.2.1 Drivers of integration.....	40
5.2.2 Inhibitors to integration.....	42
5.3 AB Sverull.....	44
5.3.1 Drivers of integration.....	44
5.3.2 Inhibitors to integration.....	47
5.4 Ravema AB.....	50
5.4.1 Drivers of integration.....	50
5.4.2 Inhibitors to integration.....	52
5.5 AB Östergötlands Maskinaffär.....	54
5.5.1 Drivers for integration.....	54
5.5.2 Inhibitors to integration.....	56
5.6 Cross-case analysis.....	58
5.6.1 Which are the drivers of integration?.....	59
5.6.2 Which are the inhibitors to integration?.....	62
6 COMPILATION OF FINDINGS.....	67
6.1 How does the integration of the procurement process affect the purchasing procedures?.....	67
6.2 Which are the drivers of integration of the procurement process?.....	68
6.3 Which are the inhibitors to integration of the procurement process?.....	70
7 IMPLICATIONS.....	72
7.1 Implications for theory.....	72
7.2 Implications for future research.....	72
7.3 Implications for providers of integration solutions.....	73
REFERENCES.....	75
Articles.....	75
Books.....	78
Websites.....	80
Personal communication.....	80

APPENDICES:

APPENDIX A: INTERVIEW GUIDE

LIST OF TABLES AND FIGURES

<i>Figure 2:1</i>	Stages of e-business development	7
<i>Figure 3:1</i>	Emerged frame of reference	23
<i>Figure 6:1</i>	Importance of positive factors and the possibility to concrete them	68
<i>Figure 6:2</i>	Importance of inhibiting factors	70
TABLE 3:1	Integration drivers	22
TABLE 3:2	Integration inhibitors	23
TABLE 4:1	Relevant situations for different research strategies	26
TABLE 4:2	Six sources of evidence: strengths and weaknesses	29
TABLE 4:3	Comparison of survey methods	30
TABLE 5:1	Importance of operational factors	59
TABLE 5:2	Importance of VMI	59
TABLE 5:3	Importance of e-billing services	60
TABLE 5:4	Importance of strategic factors	61
TABLE 5:5	Importance of external factors	62
TABLE 5:6	Importance of technical inhibitors	62
TABLE 5:7	Importance of issues regarding legislation and relationships	63
TABLE 5:8	Importance of cultural issues	64
TABLE 5:9	Importance of issues regarding perceived costs and benefits	65

1 PROBLEM AREA

In the first chapter we give a short introduction and background to the study. First we introduce the reader to procurement processes and how they have evolved into supply chain management initiatives. Integration solutions and how they simplify supply chain management is presented. Next is our problem discussion and finally we present our purpose, research questions and delimitations.

1.1 Introduction

Companies have for a long time restructured and reengineered to increase organisational effectiveness. Many have also started to look beyond their organizational boundaries (Zsidisin & Ellram, 2001). Much attention has turned from an intra-enterprise focus towards an inter-enterprise focus and how collaborative trading partners can manage their processes better (Rudberg et al., 2001). Working closely with strategic suppliers or customers can improve an organisation's performance (Zsidisin & Ellram, 2001). The shift in focus has been driven by globalization and increasing competition. Managers have realized a need to gain new competitive advantages by improving information flows (Attaran, 2001; Morrell & Ezingard, 2002; Rudberg et al., 2001). Especially collaboration regarding procurement activities can give significant benefits (Attaran, 2001).

The increasing interest in collaboration between trading partners reflects the fact that managers have reconsidered what efficient purchasing is. Traditionally the optimisation of each single transaction has been the primary efficiency driver. The focus has therefore often been on the paid price in each transaction. However, managers have realized that procurement behaviour may have a strong impact on indirect procurement costs. These indirect costs, e.g. costs for handling goods, storage, supplier handling, capital, administration of orders, are sometimes better targets for cost reductions than price. To attack indirect costs business partners often have to collaborate. It requires mutual adjustments of equipment, systems and working methods (Gadde & Håkansson, 2001).

Companies have therefore been evaluating business partners' resources to see how they can be used to increase efficiency (Fawcett & Magnan, 2002). As a result the procurement procedures are changing from paper-based labour-intensive to integrated electronic procedures that automate or facilitate human interactions (Osmonbekov et al., 2002). These new electronic procurement (e-procurement) systems however require complex mechanisms that allow business processes to be integrated across company borders. Successful implementation requires active participation by both trading partners to adapt work- and information flows to get the right information at the right time (Hsieh et al., 2002).

This type of effort to integrate resources across company boundaries and align objectives to deliver greater value are today known as supply chain management (SCM) initiatives (Fawcett & Magnan, 2002). The main stated objectives of SCM are to lower costs and to improve customer service (Persson, 1997). The interest in SCM has steadily increased since the 1980s when more and more companies began to realize the benefits of collaborative relationships (Tarn et al., 2002). SCM can be defined as:

“An integrative philosophy to manage the total flow of a distribution channel from the supplier to the ultimate user” (Ellram & Cooper, 1990, pp. 1)

SCM follows a recent trend among management concepts. Managers agree that both strategic and operational benefits can be achieved by integrating or coordinating separate functions or activities (Persson, 1997). SCM involves coordination of an organisation’s internal planning, manufacturing and procurement efforts with its external partners such as suppliers and retailers but also customers (McLaren et al., 2002; Tarn et al., 2002).

Coordination of functions and activities between different companies has never been unproblematic. For instance, the adoption of electronic linkages between companies has not been as uncomplicated as first expected (Jun & Cai, 2003; Morrell & Ezingard, 2002; Metts et al., 2003). The most common technology has previously been electronic data interchange (EDI). Although EDI achieves integration it still has several weaknesses as for instance inflexibility and low maintainability (Themistocleous & Irani, 2001). However, since the mid 1990s, innovations in new communication systems, such as Internet technologies, have created new opportunities for communication between companies and enabled a unique flexibility in the supply chain (Helander, 2000; Nurmilaakso et al., 2002). Today there is hardly any dispute about the notion that electronic business (e-business), i.e. conducting business on the Internet, is one of the most remarkable business paradigms of our time. More and more companies bet on its applications as a key imperative for their success (Davydov, 2001).

1.2 Background

One of the major benefits that e-business solutions have brought is an increased possibility to integrate business processes (Davydov, 2001). Supply chain integration is however a difficult task. It requires thorough understanding of trading partners’ needs and objectives and various sources of expertise are required (Themistocleous & Irani, 2001). Supply chain integration and synchronisation amongst partners can however reduce lead times, increase sales and improve customer service (McLaren et al., 2002).

1.2.1 Integration

To understand what integration is about we have to take a closer look at the word integration itself. It has been defined as:

“To bring together or incorporate (parts) into a whole.” (Helander, 2000, pp. 44)

It is not enough to trade goods for money. There has to be more interaction before the involved parties can be considered a whole and integrated. However, they should still be considered as two separate legal entities and the intention is not to merge or acquire the other. It is instead useful to talk about integration in terms of processes, organisations and information technology (Helander, 2000). Much of the performance improvement that integration can bring stem from more efficient information flows between supply chain members. Consequently there has been a growing interest in information technology and integrating processes that is dependant on effective information flow (Rudberg et al., 2002).

1.2.2 Integration enablers

The term information system (IS) is defined as a system for generating, sending, receiving, storing or otherwise processing data messages (United Nations Commission on International Trade Law, 1996). Inter-organisational systems (IOS), i.e. automated IS that connect two or more parties and allow them to share data and resources of a digital format, are key enablers for SCM initiatives and integration with business partners. Recent technological advances together with an increased awareness of the opportunities that e-business solutions can bring have encouraged the adoption of such systems (Morrell & Ezingard, 2002).

Conducting e-business involves using Internet technology to streamline processes, improve productivity and increase efficiency. E-business enables companies to easily communicate with partners, vendors and customers and connect internal IS and conduct commerce in a secure manner (IBM, 2003). The objective of business-to-business (B2B) e-business is to remove manual trading processes. This can be achieved by allowing different companies' enterprise resource planning systems (ERP-system) to exchange information (Hasselbring & Wiegand, 2000). The ERP-system is a software that links together databases from marketing, logistics, manufacturing, procurement, accounting etc. to simplify information sharing within the organisation (Chaston, 2001).

The most commonly used IOS for integration between two companies is electronic data interchange (EDI). EDI can be described as the direct electronic transmission of standard business forms between two organisations (Lankford & Johnson, 2000). Some researchers however predict that the Internet will more or less replace EDI as the most important IOS. The fact that the number of Internet users is growing rapidly and the unique capabilities of the Internet for B2B transactions is used for support (Jun & Cai, 2003).

What has enabled the Internet to replace EDI is the development of XML, i.e. the extensible mark-up language. XML is a programming language that is designed to

improve the functionality of the Internet by structuring the information in a flexible manner (Nurmilaakso et al., 2002; Hasselbring & Wiegand, 2000). For small and medium sized companies (SME), i.e. companies with less than 250 employees and a turnover of no more than 500 MSEK, EDI has proven to be too expensive and complicated. With the emergence of the Internet and XML the same functionality has been put in reach for SME (Hasselbring & Weigand, 2001).

One of the main incentives to adopt e-business systems is the integration and automation of business processes (Themistocleous & Irani, 2002). Focus has previously been on how to implement new systems. Today it is not economically justifiable to spend fortunes on new systems because of high demands of profitability. The focus has therefore been shifted towards how the lifetime can be prolonged (Gartner, 2001). Further, in a modern company there could be hundreds of different applications and data formats (Helander, 2000). The integration of these different applications has therefore been a barrier to business process automation. Application integration (AI) addresses this problem. AI is a technology that allows functionality from different applications to be incorporated (Themistocleous & Irani, 2002). The term application integration is defined as the:

“Unrestricted sharing of information between two or more enterprise applications. A set of technologies that allow movement and exchange of information between different applications and business processes within and between organisations.” (Linthicum, 2000, pp. 354)

AI addresses the need to integrate both intra- and inter-organisational systems. AI can efficiently integrate different IS and e-business solutions into a flexible and manageable infrastructure. For instance trading partners with different ERP-systems can easily exchange information (Themistocleous & Irani, 2001).

Despite the great potential of integration solutions, the adoption has not been uncomplicated. Especially SME have been reluctant to adopt integration solutions (Jun & Cai, 2003; Morrell & Ezingard, 2002; Metts et al., 2003). The new opportunities, brought by the Internet, AI and XML, could nevertheless have a profound effect on SME (Morrel & Ezingard 2002).

1.3 Problem discussion

The globalization and increased competition has forced managers to not only consider activities in the own organisation but rather processes that penetrates networks of organisations (Rudberg et al., 2002). The members in such supply chains are however confronted with problems regarding how to strike a balance between internal needs for different organisational and technological systems and external needs for connectivity and share-ability of messages, data, applications and processes (Themistocleous & Irani, 2001). Although small and medium sized enterprises are embracing e-business, there is also evidence showing that they are not utilizing it to its full potential. An interesting

question is therefore what factors promote and what factors inhibit or retard further e-business development and implementation among SME (Metts et al., 2003).

Integration in the supply chain means sharing and optimization of information and it involves transporting, routing and transforming of perhaps hundreds of messages per second (Vlachopoulou & Manthou, 2003). There are today several different integration alternatives. EDI has previously been the most common one. Although it achieves business integration it is not adequate for all cross enterprise incorporations. EDI is a complex technology and does not always provide the flexibility and maintainability demanded (Themistocleous & Irani, 2001). The rise of the Internet as a B2B communication vehicle has created a new set of opportunities for companies that want to automate the flow of information and integrate processes across the supply chain (Vlachopoulou & Manthou, 2003). It is important to know how these different technologies affect the buying centre structure and its processes before making a decision (Osmonbekov et al., 2002). There is however lack of a suitable framework for analysing the costs and benefits. It is therefore very difficult to determine which approach is most suitable for an organisation (McLaren et al., 2002).

Although XML supports the integration of Internet-based transactions, it cannot address all integration problems. Many transactions are not run over the Internet but on internal IS. In addition, organisations often consist of a set of complex, incompatible IS with different data formats and various programming models that require many resources to piece them together. During recent years a number of companies have failed due to lack of management support, insufficient budgets and cultural issues (Themistocleous & Irani, 2002). It would therefore be interesting to investigate how the inhibiting impact of cultural issues can be minimized and how managements' attitudes and beliefs can be shaped to support integration.

A new generation of integrating software called application integration (AI) has been introduced in order to allow companies to develop an integrated IT infrastructure. AI is still a relatively new area and there is a need of knowledge regarding the capabilities of this new technology and also its benefits and barriers (Themistocleous & Irani, 2001).

Investigations the past ten years of successful implementations of IOS have shown that significant benefits can be achieved. Most of the well-examined cases have however been of large organisations. Few cases have examined how SME and their managers perceive these electronic supply chain links. A question raised is therefore what drives or inhibits their implementation? (Morrell & Ezingard, 2002)

In several industries where e-business has had an impact, distributors have been forced to change their scope of business since manufacturers have been given the possibility to sell directly to customers. For companies selling industrial goods and services, the distributors play an important role since they are able to offer valuable services that the suppliers never could themselves. Integration solutions have instead given distributors a

chance to further enhance the value that they create for their customers (Per Svensson, personal communication, 22 April 2003). Distributors have argued that they could improve their position on the market by focusing on their role as product distributor. This is possible since processes that are very repetitive, such as the purchasing of products with stable demand, can be automated (Attaran, 2001; Jun & Cai, 2003; Morrell & Ezingear, 2002). Despite this, few distributors have yet adopted these systems. A question raised is therefore why this is not the case? (Per Svensson, personal communication, 22 April 2003)

1.4 Purpose

The purpose of our study is to discuss how the purchasing procedures are affected by the integration of the procurement process and to describe small and medium sized distributors' driving and inhibiting factors for integration of the procurement process with their suppliers. A few selected companies will be analysed and we hope our conclusions will be valuable to companies that offer integration solutions.

To be able to reach our objective we will answer three research questions. The first research question is only theoretical and will be discussed, based on theory, to increase our understanding of how companies' are affected by the integration of the procurement process. The last two research questions are empirical.

1. How does the integration of the procurement process affect the purchasing procedures?
2. Which are the drivers of integration of the procurement process?
3. Which are the inhibitors to integration of the procurement process?

1.5 Delimitations

We will compare our cases procurement process to AI via the Internet. We will however not deal with the technical aspects of integration systems but instead concentrate on the underlying advantages and disadvantages that they convey. We will look into internal factors, stemming from changes in the communication process and information flow, as well as external factors that affect the decision to integrate. Further, we will only investigate distributors of industrial goods and services, since the driving and inhibiting factors can vary significantly across industries and depend on the complexity of the product traded.

2 LITERATURE REVIEW

In this chapter theories that are relevant to the study is presented. First, theory regarding the development stages of integration and enabling technologies are presented. E-procurement and the driving and inhibiting factors of integration will then be discussed.

2.1 Integration development: A stage model

As supply chains evolve from having an internal to an external focus where collaborative relationships become more and more important, organisations may experience greater benefits (McLaren et al., 2002). The development model that describes each stage in the e-business development process was deployed by Metts et al. (2003). It is proposed that e-business development takes place in four stages where the model cost, technological demands and complexity increase by each stage. The four stages are:

1. Presence
2. Portals
3. Transaction integration
4. Enterprise integration

The model is sequential but it allows companies to enter at any stage. All the previous stages issues must however be addressed.

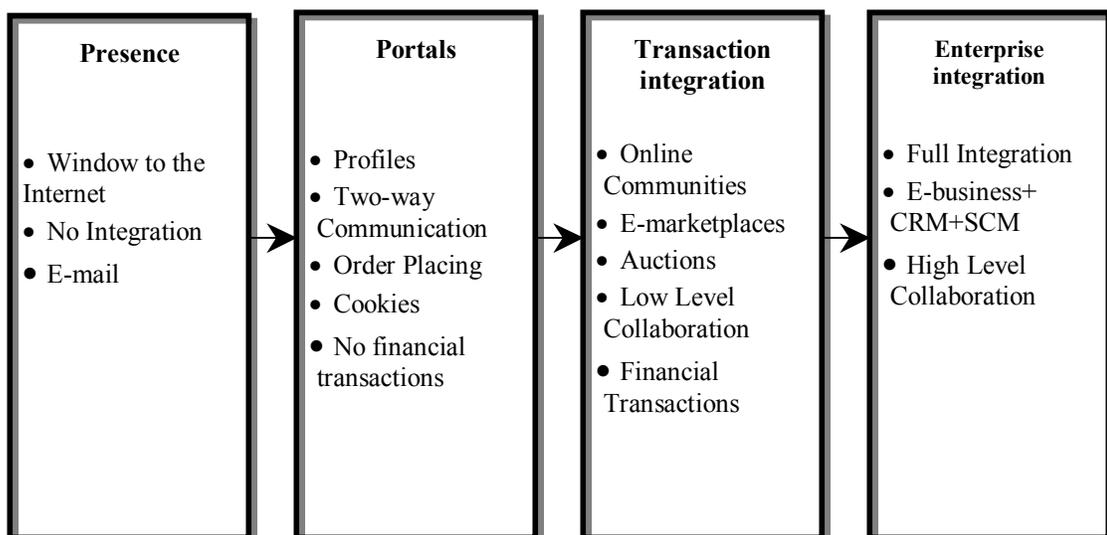


Figure 2:1. Stages of e-business development (Metts et al., 2003, pp. 15), refined by the authors

Presence

The presence stage involves the first step that an organisation takes to explore the possibilities of e-business. A company having a Web site for one-way communication to any potential visitor characterizes the first stage. There is no integration with neither internal nor external processes. The presence stage is primarily used to attract new customers.

Portals

The second stage is characterized by the introduction of two-way communication, customer order placing and the use of cookies and customer profiles. Cookies are small text files that are stored on the computer when you access a website. The file contains information that identifies each user. Other than attracting new customers, companies are therefore given the opportunity to engage and retain visitors and relate them to their individual preferences for customization purposes. The portals stage is also characterized by the ability to link displayed information with inventory data and search capabilities for the users. It is however not possible to process financial transactions.

Transaction integration

The third stage is differentiated from the preceding stages, mainly by the presence of financial transactions between partners but also by the fact that interactions can be for both buying and selling. Transaction integration involves participation in online communities, electronic auctions or third party electronic marketplaces (e-marketplace). An e-marketplace is an online market where buyers and seller meet to exchange information, conduct trade and collaborate with each other. Integration at this stage is viewed as the integration of internal processes, which allows the optimisation of all the operations inside the organisation.

Enterprise integration

This level of integration involves high levels of collaboration between trading partners. The collaboration includes e-business, supply chain management and customer relationship management (CRM). CRM is a way for companies, generally by using software and or Internet capabilities, to manage customer relationships in an organised way. At this stage partners' IS melt together into one system that serves all needs. It is however somewhat of an ideal concept and companies need to solve hard technology problems and over-whelming integration issues to reach this stage. However, those companies that do become successful in this stage can be distinguished by:

- Intimately understanding their partners' current and future strategic needs;
- Working proactively with their partners to create solutions that address these needs;
- Using information sharing;
- Having long-term contracts.

2.2 Enabling technologies

There are two main types of inter-organisational systems, i.e. systems that connect two parties and allow them to interact with one another and share data, EDI and the Internet. Both these systems will be covered here. In order to integrate the ERP-system or the internal information-system with the Internet, another solution called application integration is also needed.

2.2.1 Electronic data interchange

The major goal of EDI is to reduce the time that is spent on printing, mailing, and re-entering information. EDI plays an important role in the improvement of process management. It allows companies to exchange data directly through computer-to-computer communications (Lankford et al., 2000). Paper documents such as purchase orders, shipping documents, invoices and payments are replaced with electronic documents. EDI links the computer processes and allows the electronic documents to be transferred without any duplicate data entry (Hasselbring & Wiegand, 2000).

To register the information directly in the receiver's system, the electronic documents have to be standardized (Fredholm, 1995). There are on the other hand no single common standard among EDI users. Some of the most frequently used standards are EDIFACT, an international standard developed by UN, and ANSI-X12, the dominant standard in the USA (Hasselbring & Wiegand, 2000). Many researchers argue that EDI will continue to be an important communication vehicle for years to come. Many companies have already invested heavily in EDI, and have also achieved benefits. Their incentives are consequently not strong enough to switch to other technologies such as the Internet. However, because of the complexity of EDI and the fact that it does not provide the flexibility and maintainability demanded, companies that are not yet integrated are now looking for other technologies instead (Themistocleous & Irani, 2001).

2.2.2 The Internet and XML

EDI has been in use for more than 30 years but its diffusion rate has been slow. It is partly because of its complexities (Hasselbring & Weigand, 2001) and because it is still viewed as an insecure and vulnerable vehicle for sending business documents (Jun & Cai, 2003), but also due to that EDI over private lines or value-added networks (VAN) is too expensive for SME. There is however hope that the event of Internet-EDI (I-EDI) will turn the tide. With the development of the Internet new possibilities have risen for e-business. Since the Internet is open to everybody, is accessible all over the world and has an easy interface in the form of the World Wide Web (WWW), many organisations can be reached. The Internet is also cheaper than VAN that charge money for each message or collection of messages (Hasselbring & Weigand, 2001). The Internet gives small companies a new opportunity for integrating with suppliers (Angeles, 2000; Hasselbring & Weigand, 2001; Lankford & Johnson, 2000).

The documents and messages that are sent between organisations via the Internet must be manageable for each involved enterprise, independent on which information system that is used internally. A way to solve this problem is by using the extended mark-up language or XML (Hasselbring & Wiegand, 2000). XML is a programming language that is designed to improve the functionality of the Internet by structuring the information in a flexible manner (Nurmilaakso et al., 2002; Hasselbring & Wiegand, 2000). Researchers argue these changes brought by Internet technologies could have a profound effect on companies and especially SME (Morrell & Ezingard, 2002).

The flexibility of XML however also brings some risks. Each organisation can develop its own dialect of XML messages suited to its own business processes. If that is the case they will not be able to understand other dialects. Applications using XML is driving the adoption of e-procurement. Therefore standards or mapping (matching of document standards between trading partners) has to be used (Hasselbring & Wiegand, 2000).

2.2.3 Application integration

In the last decades companies have used EDI for electronic exchange of structured business documents. The development of the Internet and XML has however led to an increased use of new software called Application integration (AI) (Themistocleous & Irani, 2002). The term Application integration is defined as the:

“Unrestricted sharing of information between two or more enterprise applications. A set of technologies that allow the movement and exchange of information between different applications and business processes within and between organisations.” (Linthicum, 2000, pp. 354)

AI is a software system that is implemented with other software systems and that manages interactions between applications and other information resources. One application puts (publishes) a message to a message-broker. The message-broker then transforms the message to the appropriate format before the receiving application gets (subscribe) the message. AI systems are designed to let applications share processes and data as if they were a single system. One of the advantages of AI is that they leave systems as they are, minimising change, and still allow information to be shared (Linthicum, 2000).

There is a need to define the range of AI applications as well as to categorise the types of systems that can be integrated through these applications. The proposed classification is to divide AI into two different categories (Themistocleous & Irani, 2002):

- Intra-organisational AI
- Inter-organisational AI

The first category includes the integration of different systems within the company. Many organisations consist of a set of complex, heterogeneous internal information systems that cannot communicate with each other. AI can bridge the gaps created by these systems, since it allows functionality from the different systems to be integrated. The second subcategory is inter-organisational application integration and these seek to incorporate cross-enterprise business processes and systems in the supply chain (Themistocleous & Irani, 2002).

2.3 e-Procurement

Research suggests that the organisational procurement process involves a complex series of events that allow a firm to go from the recognition of a need, through technical specification and potential supplier evaluation towards a final purchase decision. Although a general pattern exists, execution of the procurement event varies greatly from decision to decision, due to the difference of complexity of the product bought (Osmonbekov et al., 2002). It is also suggested that there are three different buy classes that affects the procurement process. These are; straight re-buy, modified re-buy and new task buying. It is further proposed that the three buy classes differ in the extent to which decision makers (Iyer, 1996);

1. consider the purchase situation to be new or unfamiliar (newness of the problem),
2. gather additional information (information requirements),
3. seriously consider new alternatives (consideration of new alternatives) (Iyer, 1996).

It is predicted that these three criteria increases in value as the buying situation change from straight re-buy to modified re-buy to new task buying (Iyer, 1996).

For decades companies have been searching for ways to cut paperwork, reduce costs and to increase the efficiency of their procurement procedures. The Internet now penetrates every corner of our society and its use for determining optimal order size, making orders and identifying the best supplier can now be applied by most companies. For some companies the move into online procurement has been a necessity to survive (Hsieh et al., 2002).

2.3.1 Buying centre characteristics

The buying centre contains of a group of employees that initiates, considers and makes a purchase decision in an organizational setting (Osmonbekov et al., 2002). It is defined as:

“A subset of the organizational actors...consisting of five roles; users, influencers, deciders, buyers and gatekeepers” (Webster & Wind, 1972, pp. 17).

The structure of the buying centre is characterized by (Osmonbekov et al., 2002);

- *Size*: number of individual participants
- *Hierarchical level*: managerial authority levels
- *Functional level*: specialization by work area
- *Participation*: involvement in procurement stages by members

Size

Research shows that the size of the buying centre increases as roles in the buying centre become more formalised (Dawes et al., 1998) and as the complexity of the purchase process increases (Johnston & Bonoma, 1981). The buying centre for e-procurement, i.e. the buying centre when using e-business tools for procurement, decrease both the formalisation of the buying centre roles and the complexity of the purchase decision. This also brings a reduced size of the buying centre (Osmonbekov et al., 2002).

In addition to traditional modes for communication, documents, opinions, commercial and technical information can be exchanged through e-mail, Web-based videoconferencing and chat. Formalization, i.e. the extent by which activities are prescribed by rules, policies and procedures, is reduced as effective communication replaces the need to manage the information flow and paper work tightly. The perhaps largest benefit of e-procurement applications is that they eliminate these obstacles of formalisation (Kalakota & Robinson, 1999). Further, because of the increased level of communication between members, the business relations between buying centre members become more informal (Boyle & Alwitt, 1999).

Regarding the complexity of the purchase decision, e-commerce tools, such as comprehensive online databases of purchase history, enable buying centre members to access relevant product information quickly and efficiently, which increases the accuracy of information and decreases the time spent on searching for information (Osmonbekov et al., 2002).

Consequently, reduced formalisation and overall complexity in the purchasing process are expected results from the adoption of e-procurement tools. As information is easier to access and transfer among buying centre members, fewer members are required to make decisions. Thus, the adoption of e-procurement tools is expected to decrease the size of the buying centre (Osmonbekov et al., 2002).

Hierarchical level

An individual's formal rank is strongly connected to the acquisition and utilization of procurement information. Individuals of different hierarchical levels, senior managers, plant managers, production technicians, and others, differ in the number of decision stages that they participate in (Osmonbekov et al., 2002).

As software automation results in fewer levels of management actively engaging in each particular procurement episode, the structure of the buying centre tends to be flattened. For instance, when a low-ranking user logs on to a procurement application, the employee's profile contains the pre-authorizations necessary, such as approved multi-vendor catalogues, product types and expenditure levels. It means that individuals can move swiftly through vendor selection and product purchase without involving senior managers (Osmonbekov et al., 2002).

Functional level

The automation of procurement tasks that e-procurement applications provide tend to streamline the buying centre by reducing the number and type of job functions that are actively involved in the procurement process. Technical details, performance metrics, regulatory requirements, and other key facets of raw material can be archived by using intranet procurement applications. The buying centre members are thereafter able to query such information directly through online databases, without involving personnel from product planning, engineering or production. Hence, e-procurement applications lower procurement cycle times and reduces the functional range of employees directly involved in procurement episodes (Osmonbekov et al., 2002).

Participation

The degree of participation from each buying centre member is important to study since it is suggested to affect the level of influence projected on other members (McQuiston, 1989). The participation in the buying centre is defined as the:

“Amount of written or verbal communication offered to others in the decision making unit (DMU) during the course of the purchase decision...” (McQuiston, 1989, pp.68).

Research suggests that the more an employee's position is at stake, the higher is his/her participation degree (McQuiston & Dickson, 1991). The previously suggested overall decrease in the size of the buying centre leads to that the relative weight of each member's responsibility for the purchasing decision increases. It will therefore enhance the probability of bearing personal consequences for the decision (Osmonbekov et al., 2002). Further, e-procurement allows much more information to be accessed and exchanged among members. Members can participate in online discussions without leaving their offices, which encourages both more frequent and longer discussions (Kosiur, 1997).

2.3.2 The buying centre processes

Other than changes to the structure, research suggests that buying centre processes, i.e. the attitudinal and behavioural facets of member interactions, also are changing (Moriarty, 1983; Dawes et al., 1998). Especially the influence of technical personnel and

the conflicts and coordination within the DMU are affected by e-procurement applications (Osmonbekov et al., 2002).

Influence of technical personnel

Buying centres often include technical personnel such as engineers, technicians and system experts. Their ability to influence buying decisions is substantial in buying centres responsible for major capital purchases, materials and component parts. It is due to their high degree of technical knowledge and expert power (Osmonbekov et al., 2002). Further, industrial buyers are likely to use e-business tools to obtain highly technical information about products. The information is maybe only understood by the technicians in the buying centre (Boyle & Alwitt, 1999). Thereby technical personnel are likely to increase their influence over the buying decision (Osmonbekov et al., 2002).

Conflict

Conflicts often arise in buying centres because of divergent objectives, task interdependence and incompatible management styles and approaches. It is damaging to performance and causes mistrust, misunderstanding and anxiety (Ding, 1997). The main contributor to conflict is a communication barrier between departments (Barclay, 1991).

Electronic business tools can increase the inter-departmental communication (Boyle & Alwitt, 1999). The risk for conflicts is then lowered because the increased communication and access to additional information allows similar understandings of goals, wider access to documents and fewer opportunities to suspect hidden agendas and information batching by individual buying centre members. It builds understanding across the various departmental perspectives (Osmonbekov et al., 2002).

Coordination

Interaction patterns and activities within the buying centre are complex and their interdependencies are embedded in the overall organisational network of communications. For instance, when purchasing a piece of complex machinery an engineering member may be in charge for checking technical specifications, an accounting member may be responsible for calculating costs and depreciation schedules etc. These tasks are not performed simultaneously. Relevant information is often processed through communication dyads of only two members. The coordination among all members is therefore a difficult task (Johnston & Bonoma, 1981). The advantage of a many-to-many communication interface is that it allows members to communicate better. All members of the buying centre have the possibility to post, view and track inputs of others on the company's Web site, which bring less confusion and a higher degree of clarity regarding scheduling and evaluation. An accountant can check order updates made by an engineer in real time and update cost projections accordingly (Osmonbekov et al., 2002).

2.3.3 Impact on outcomes

Adoption of e-procurement applications opens the possibility to increase both efficiency and effectiveness. To be effective is to produce a desired result, while efficiency is to function effectively with little waste of effort (Kalakota & Robinson, 1999).

E-business tools reduce transaction costs between organisations by facilitating communication and enabling tasks to be completed more rapidly. The conversion of paper documents for ordering, invoicing and tracking into electronic documents lowers expenses associated with accounting, record keeping and the various archival tasks (Rasmusson, 1999). Other benefits include reduced order cycle time and better timeliness in ordering and delivery (Peters & Hogensen, 1999). Order cycle cost reductions occur when Internet-based buying lowers managerial involvement in purchase activities in the number of separate buying tasks that must be carried out (Kalakota & Robinson, 1999). E-business tools offer the opportunity to group tasks such as vendor identification, specification transfer and pricing into a seamless communication stream, lowering time and cost investments (Solomon, 1999).

Streamlining the buying centre (reduced size, hierarchical, and functional levels) along with more informed participation implies faster and more efficient decision-making. Further, highly knowledgeable technical personnel, reduced conflict and better coordination imply better product selection and inventory management (Osmonbekov et al., 2002).

2.4 Drivers of integration

The adoption drivers for integration systems in the procurement process can be divided into three different categories, operational, strategic and external drivers (Morrell & Ezingear, 2002; Attaran, 2001).

2.4.1 Operational drivers

It is suggested that one of the most important benefits of electronic exchange of information between organisations is decreased transaction cost, i.e. inefficiencies in the market that add to the cost of a product or service (Morell & Ezingear, 2002). These decreased transaction costs are derived from eliminating the need for re-keying data. The result is an improved information flow, i.e. more and better updated information, and therefore also an error reduction. Because the orders are sent directly to the sellers' system and registered automatically, the buyers can benefit from an improved efficiency. The order routines are improved and the paperwork is reduced (Attaran, 2001; Jun & Cai, 2003; Morell & Ezingear, 2002). Better timeliness in order routines and deliveries as well as receiving timely order confirmations is valuable (Attaran, 2001; Morrell & Ezingear, 2002). Integrated procurement processes can also shorten the lead-time and as a consequence decrease the inventory levels (Attaran, 2001).

Where only order information is shared between partners, the benefits are usually efficiency gains such as lower transaction costs as mentioned above. Vendor managed inventory (VMI) is however another more advanced service opportunity. VMI is a means of optimizing supply chain performance in which the supplier is responsible for maintaining the buyer's inventory levels. The supplier has access to the buyer's inventory data and is responsible for generating purchase orders (Disney & Towill, 2003). The supplier benefits from valuable insights of how the demand of their products is changing over time, which brings the possibility to set up more correct production schedules. Correct production schedules also bring decreased inventory levels. Insight into demand changes could also remove the bullwhip effect (Morrell & Ezingard, 2002; McLaren et al., 2002) which refers to a scenario where the orders to the supplier tend to have larger fluctuations than sales to the buyer (Lee et al., 1997). The buyer on the other hand benefits from reduced administrative costs since less time is spent on placing, managing and following up orders. The buyers also have the possibility to decrease inventory levels. The suppliers' increased responsibilities to have the products available on time allow the buyers to decrease safety stocks and thereby lowering inventory levels (Pohlen & Goldsby, 2003).

Electronic billing (e-billing) services is another opportunity (Attaran, 2001; Jun & Cai, 2003). E-billing is an Internet-based payment solution (Haschka, 2002). It enables the posting and presentment of invoices on the Internet and it reduces handling costs (Korper & Ellis, 2000). If an electronic billing function is used, it leads to that funds are not tied up in accounts payable or receivable for a long time and that the cash flow is improved (Attaran, 2001; Jun & Cai, 2003; Korper & Ellis, 2000).

2.4.2 Strategic drivers

Early applications for Internet-based procurement have concentrated on improving data flow and error reduction (Attaran, 2001). It is now being argued that the greatest value of using integrated systems for procurement will emerge in strategic areas. It is suggested that where companies are able to reap the biggest benefits are from improved competitiveness (Attaran, 2001). The improved competitiveness is possible due to reduced administrative hours. The time saved can be used to provide better levels of customer service. An enhanced image, for instance by being in the technological forefront, (Attaran, 2001) as well as improved buyer/supplier relationships due to the increased level of mutual cooperation could also improve the competitiveness (Attaran, 2001; Morrell & Ezingard, 2002).

The improved efficiency mentioned above also allows companies to spend more time on market analysis. As a result they gain a better insight into market changes and get a better understanding of the customers' needs. Companies are therefore able to respond more timely to market changes (Attaran, 2001; Murphy & Daley, 1999).

Consolidated purchasing practices can lead to macro benefits for the whole supply chain that then turn into micro improvements for each member. All trading partners are able to reap macro benefits in the form of decreased transaction costs and improved efficiency. The micro improvements that can be derived from the mentioned macro improvements include greater discounts and better service from suppliers (Attaran, 2001; Morrell & Ezingard, 2002).

2.4.3 External forces

Other factors that encourage adoption are pressure from business partners and/or competition. It is argued that especially SME are affected by bargaining power. It was also found that organisations were forced to implement these systems even though they were unable or ready to take advantage of them (Morrell & Ezingard, 2002).

2.5 Inhibitors to integration

The inhibitors can be divided into; technical issues, legal issues, business partner relationship issues, cultural issues, human resource management issues (Jun & Cai, 2003; Morrell & Ezingard, 2002) and perceived costs and benefits issues (Jun & Cai, 2003).

2.5.1 Technical issues

The full integration of IOS with an organisation's internal system and with those of its trading partners is however a very difficult task that require enormous resources. This is true due to the incompatibility between IOS software and in-house applications, and the several standards of information and data formats (Hsieh et al., 2002; Jun & Cai, 2003). Companies also have different types of internal systems, which add to the inter-organisational incompatibility (Morrell & Ezingard, 2002). The question is then whether companies have, or can afford, the required competences and resources to link their internal information system to its online procurement system. Research suggests that many companies do not have the required competences (Hsieh et al., 2002). It has even been argued that lack of technical knowledge is one of the largest obstacles when implementing a new application or system (Attaran, 2001). The administration of the integration solution must also be considered. Maintenance includes performance management, disaster recovery, configuration management and security administration (Linthicum, 2000).

When sending data between organisations using an electronic link there is an issue of security. A few mouse-clicks and a company's most valuable asset, its information, could be in the hands of a competitor. Message content could be modified, the sequence altered and repudiation of message origin or receipt are possible. These concerns have to be handled in some way (Jun & Cai, 2003; Morrell & Ezingard, 2002; Linthicum, 2000). In addition, system stability, error recovery and data backup are concerns for most organisations (Jun & Cai, 2003).

2.5.2 Legal issues

It is hard to regulate e-business for two reasons. First, the scope and technology is changing rapidly. Besides, the formulation of the law has been an evolutionary process, adapting to the needs of the society. Secondly, the nature of the Internet is trans-national. It is therefore a problem to decide which legal system that should be used for the transactions. The development of new kinds of commercial activities in the electronic environment depends on assuring companies of that the use of the network is secure and reliable (Zekos, 2002).

Business partners using an electronic link need to clearly make an agreement on all terms and conditions including shipment, location of delivery, duration of contract, who pays the transaction costs, and the sender's and receiver's obligation if a third party intercepts the message sent (Jun & Cai, 2003).

2.5.3 Business relationship issues

The switching cost involves the cost of switching from one supplier to another. Close collaboration with a specific supplier therefore further increases the switching cost, since a lot of resources have been put into that particular relationship (McLaren et al., 2002). Another aspect of partner relationships is that distributors may feel that automating the communication process might hurt the business relationship, due the decreased level of personal contacts with the supplier (Morrell & Ezingard, 2002).

2.5.4 Cultural issues

Cultural differences can be seen between countries, industries as well as companies. New technologies such as the Internet provide a platform for human interaction and a medium for cultural, social, commercial and linguistic facets of communication. The enhanced capabilities also present challenges because effective interpersonal communication, knowledge sharing and resource transactions influence the productivity of organisations. Companies working with information technology must therefore consider numerous cultural differences as they implement new technology in new cultural settings (Zakaria & Stanton, 2003). When doing business with foreign countries there is for instance a need for international language and country specific business skills (Morrell & Ezingard, 2002). In national as well as international business there is a need for cultural awareness and sensitivity to how culture affects the adoption of new technologies. Successful implementation of IT-applications cross-culturally is dependant on careful appreciation of prevailing norms and values. Individuals within different cultures define the value of information differently. What is considered useful, meaningful and worth communicating in one culture may not be considered so in another (Zakaria & Stanton, 2003).

Many managers have questioned the value of integration strategies without having a thorough understanding of the integration-financial performance relationship. Managerial knowledge deficiencies influence the performance of the integrated supply chain. Top

managers must learn new skills to guide their firms beyond their own strategic core. The effectiveness of any change is dependant on both the environmental and organisational changes that accompany it. Top and middle managements' awareness, understanding and strong support for e-business and IOS play a crucial role in successful integration. The integration affects the whole organisation's interactions with its trading partners, business relationships and the competitive position in the industry (Jun & Cai, 2003). A low level of understanding also leads to a lower level of perceived benefits, which would be an important inhibitor towards adoption (Morrell & Ezingard, 2002).

2.5.5 Human resource management issues

The supply chain is only as strong as its weakest link. It may however not be the actual link, i.e. the IOS, which is the most fragile point in the supply chain. In fact, it may exist within one of the supply chain members (Braganza, 2002). Since the effectiveness of any technology often depends on the time and effort it takes to learn and use it, insufficient training for the managers or employees can be a critical barrier to successful implementation. In addition, new technology often brings behavioural and organisational changes to the company's culture, value and work practices (Jun & Cai, 2003). When a process changes, the jobs of those that work in the process must be changed as well. Attitudes and beliefs among the employees must be realigned with the new process (Attaran, 2001). These changes could be major inhibitors towards adoption of integration solutions (Jun & Cai, 2003). It is therefore important to make the employees engaged and involved and openly communicate with them to teach them about the new technology and answer their questions. They should not feel threatened and to prevent this they should be informed about the advantages they will receive from the new technology. Employees should be educated on the underlying issues and total costs of ownership (Attaran, 2001).

2.5.6 Issues regarding perceived costs and benefits

As with any project, economic cost is likely to be an important inhibitor to the integration of systems (Morrell & Ezingard, 2002). The costs come from system acquisition and implementation, coordinating and integrating business processes among partners, and translating and integrating data among systems (McLaren et al., 2002). Particularly among SME there have to be low uncertainty regarding costs (Morrell & Ezingard, 2002). For example, when implementing EDI the initial costs are high. The high amount of transactions that is needed before economic benefits are obtained can be the cause of important concerns (Jun & Cai, 2003).

Many companies aim to include all their suppliers in their online procurement system, but at many times the buyer may only invest in IOS with suppliers that are considered critical for long-term organisational success, i.e. if the relationship is not intense enough or if the number of transactions is not large enough, there could be no need to invest in such systems (Zsidisin & Ellram, 2001). Many organisations have also failed to adequately address performance until it is too late. Complex issues such as message rates, transactions per second and interface performance must be considered (Linthicum, 2000).

Many companies require very tangible levels of project justification and respond positively to benefits which consider revenue, costs and fixed capital. One of the reasons for low adoption rates of inter-organisational systems, despite high levels of awareness, is the lack of realisation of macro benefits in supply chain improvements. When these macro improvements are realised they turn into micro improvements for each participant in the supply chain (Morrell & Ezingard, 2002).

3 CONCEPTUALISATION AND FRAME OF REFERENCE

In this chapter we explain the issues that will be examined. The conceptualisation of the literature is presented as well as the emerged frame of reference which is developed from the conceptualisation.

3.1 Conceptualisation and operationalisation

The purpose of a conceptualisation is to explain the main areas of a study either graphically or narrative (Miles & Huberman, 1994). The previous chapter provided an overview of literature that is relevant for this study. The purpose of this chapter is to provide the conceptualisation that will make it possible to answer our research questions. The conceptualisation results in our frame of reference that lay as the foundation for collecting and analysing the gathered data.

The driving and inhibiting factors also have to be operationalised in a way that the data can be measured quantitatively (Saunders et al., 2003). We are interested in the distributors' perception of which the driving and inhibiting factors are. We will try to measure the factors impact on the decision when deciding upon the degree of integration of the procurement process. A four-degree scale which is divided into high, medium, low and no impact will be used. Some of these driving and inhibiting factors, such as the removal of double data entries, could rather easily be operationalised. Most of the factors' impacts are however very hard to measure and we will therefore leave the operationalisation to the respondents. After carefully evaluating their answers and comparing them to each other and theory we will rank the factors using our four-degree scale.

The theories that we have selected from literature review are presented below. All chosen authors bring up issues that we find relevant for our study.

Research question 1: *How does the integration of the procurement process affect the purchasing procedures?*

The first research question is as stated before a theoretical question and will therefore not be handled in this chapter.

Research question 2: *Which are the drivers of integration of the procurement process via the Internet using AI?*

Researchers have predicted that the Internet and related technologies will completely replace EDI as the most important inter-organisational system. The rapidly growing number of Internet users and the unique capabilities of the Internet for conducting B2B e-

business have been presented as evidence (Barber, 1997). The drivers of inter-organisational integration via the Internet have been argued to be of operational (Attaran, 2001; Hsieh et al., 2002; Jun & Cai, 2003; Korper & Ellis, 2001; Lankford & Johnson, 2000; McLaren et al., 2002; Morrell & Ezingard, 2002; Pohlen & Goldsby, 2003), strategic (Attaran, 2001; Morrell & Ezingard, 2002; Murphy & Daley, 1999) or external nature (Jun & Cai, 2003; Morrell & Ezingard, 2002).

To be able to answer the second research question we intend to review the above-mentioned authors' discussions and carefully consider what apply to the cases in our study. The eclectic list of integration drivers in TABLE 3:1, which has been gathered from the literature review, will form the foundation for the discussions with our respondents. Our purpose with this study is to examine our respondents' opinion of the factors' impact on the decision to integrate with their suppliers.

TABLE 3:1. Integration drivers

Types	Drivers
Operational	<ul style="list-style-type: none"> No need of re-keying data internally Decreased handling of papers Less time used for error handling Improved order confirmations Decreased order cost with VMI Decreased inventory levels by using VMI Decreased administrative costs with e-billing services Improved cash flow with e-billing services
Strategic	<ul style="list-style-type: none"> Improved customer service Improved buyer/supplier relationship More efficient handling of orders at the suppliers Better service from suppliers due to timesaving Better prices from suppliers
External	<ul style="list-style-type: none"> Pressure from competition Pressure from suppliers

Research question 3: *Which are the inhibitors to integration of the procurement process via the Internet using AI?*

Despite all opportunities that the Internet has brought, there are still many researchers that claim that EDI will continue to be the perhaps most important integration tool for years to come (Larson & Kulchitsky, 2000; Tingle, 2000). Many large companies in many industries have invested heavily in EDI-systems and have also achieved many benefits. They are not willing to switch to new Internet technologies (Larson & Kulchitsky, 2000). Many top managers also still view the Internet as vulnerable and insecure (Ratnasingham, 1998; Lankford & Johnson, 2000). Further, several inhibiting issues regarding human resource management, legislation and trading partner relationships have also been brought up by researches (Jun & Cai, 2003; Morrell & Ezingard, 2002; Hsieh et al., 2002).

In order to answer the third research question we intend to review the above-mentioned authors' discussions and carefully consider what inhibiting factors that applies to the cases in our study. The eclectic list of inhibitors in TABLE 3:2, which have been gathered from the literature review, will form the foundation for the discussions with our respondents. Our purpose with this study is to examine our respondents' opinion of the factors' impact on the decision to integrate with their suppliers.

TABLE 3:2. Integration inhibitors

Types	Inhibitors
Technical	Incompatibility across different systems and formats Issues regarding security risks Administration and maintenance
Legislation and relationship issues	Legislation issues Decreased numbers of personal contacts Increased switching cost
Cultural issues	Management's lack of understanding and support for e-business solutions Internal corporate culture The required amount of information and education to anchor the idea Cultural differences between organisations
Percieved costs & benefits	Difficulties to concrete costs Difficulties to concrete operational benefits Management's lack of ability to see strategic benefits Difficulties to value strategic benefits

3.2 Emerged frame of reference

The previous part contains the conceptualisation and operationalisation of the relevant theories that together with our research questions will form the basis for our frame of reference. The emerged frame of reference is displayed in *Figure 3:1*. At the core of our study is the integration of the procurement process via the Internet. Surrounding are our two last research questions: which are the drivers of integration of the procurement process and which are the inhibitors to integration of the procurement process? Further it shows how the integration of procurement process development is being pushed in two directions, forward by the drivers and backwards by the inhibitors.

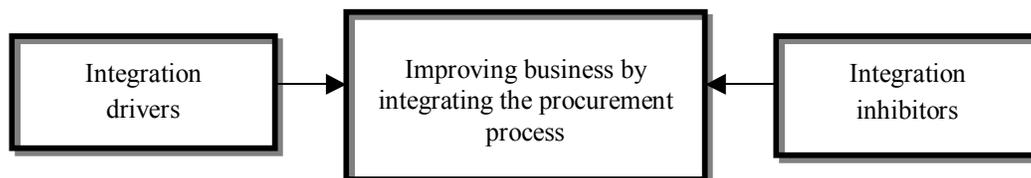


Figure 3:1. Emerged frame of reference

4 METHODOLOGY

This chapter contains a description of the central concepts of research methodology as well as the methods used when conducting this study. We motivate choice of research purpose, approach and strategy. We also describe our data collection methods, discuss our sample selection and data analysis and bring up possible methodological problems and how we have dealt with them.

4.1 Research purpose

Classifying business research on the basis of purpose allows us to understand how the nature of the problem influences the choice of research strategies. The nature of the problem will determine whether the research is exploratory, descriptive or causal (Zikmund, 2000).

Exploratory studies are used to clarify and define the nature of a problem. They are used to analyse a situation, to gain a better understanding of the dimensions of a problem. The purpose is however not to determine a particular guideline. Exploratory research is instead conducted with the expectation that subsequent research will be required to determine the proper course of action (Zikmund, 2000).

Unlike exploratory studies, descriptive research is based on some previous understanding of the nature of the research problem. The purpose of descriptive studies is to describe the characteristics of a complex phenomenon or population. Even though the answer to the question why is never given, descriptive information is in many cases enough to solve business problems (Zikmund 2000).

Causal or explanatory research is often preceded by exploratory and descriptive research. Causal studies refer to research conducted to identify cause-and-effect relationships among variables where the research problem has been defined narrowly. Research with the purpose of inferring causality should according to Zikmund (2000):

1. Establish the appropriate causal order of events
2. Measure the concomitant variation, i.e. the occurrence of two phenomena that vary together, between the presumed cause and effect
3. Recognize the presence or absence of alternative reasonable explanations or causal factors

In our study we intended to explore, describe and perhaps also start to explain the distributors' driving and inhibiting factors for integration of the procurement process with their suppliers. Some research has been conducted in this field of research, but not sufficiently and therefore our study was somewhat exploratory. Our study was however

primarily descriptive but also causal to some extent, since we aimed to describe and then perhaps also start to explain our findings from the previous stages.

4.2 Research approach

The purpose of the study and the accompanying research questions determines the best approach for a study (Yin, 1994). Qualitative research focuses on words and observations; stories, visual portrayals, meaningful characterisations, interpretations and other descriptions. The researcher's perception and interpretation comes in focus and any source of information may be informally investigated to clarify which qualities or characteristics that are associated with an object, situation or issue. The purpose of quantitative research on the other hand is to determine the quantity or extent of some phenomenon in the form of numbers that can be analysed statistically. Quantitative research also tends to be more structured than qualitative that on the other hand is more flexible (Zikmund, 2000).

Based on our purpose, research questions and the above discussion, the approach that we chose was qualitative. We aimed to describe the distributors' need of integration. We used our emerged frame of reference to try to gain a better understanding of the distributors' driving and inhibiting factors for integration of the procurement process with their suppliers. We were not interested in analysing data statistically as quantitative research implies.

4.3 Research strategy

Researchers have five different strategies to chose from, each with its own advantages and drawbacks. The research strategies that have to be considered when conducting a study, which can be seen in TABLE 4:1 below, are according to Yin (1994); experiment, survey, archival analysis, history and case study. Which strategy that is most suitable is dependant on three factors; the form of research question and whether the researcher has control over behavioural and contemporary events. The distinctions between the strategies are however not always clear and sharp. They often overlap each other instead. The objective here is to avoid important misfits (Yin, 1994).

TABLE 4.1. Relevant situations for different research strategies (Yin, 1994, pp. 6)

Strategy	Form of research question	Requires control over behavioural events	Focuses on contemporary events
Experiment	How , w hy	Yes	Yes
Survey	Who, w hat, w here, how many, how much,	No	Yes
Archival analysis	Who, w hat, w here, how many, how much,	No	Yes/No
History	How , w hy	No	No
Case study	How , w hy	No	Yes

The most important condition for differentiating among the various research strategies is to identify what type of question is being asked (Yin, 1994). We were interested in answering what and how much questions, we did not require control over behavioural events and we did focus on contemporary events. Experiment did not suit us very well. We were not interested in finding answers to how and why questions and we did not have control over behavioural events. Surveys and archival analysis answers the right kind of questions, are suitable for contemporary events and do not require control over behavioural events. There are however no archival records available that can answer our questions and surveys are not appropriate for a qualitative study as ours. Other than that, the subject was too complex to be answered by either a survey or an archival analysis. Further, our study focused on the present and consequently we did not choose a historical research strategy either.

The case study is the superior alternative when there is little control over behavioural events, the events under investigation are contemporary and when trying to answer how and why questions (Yin, 1994). In our study we were trying to describe a complex situation. We had no control over the respondents' perception of integration drivers and inhibitors. Further, the events under examination were contemporary events. We were however not trying to answer how and why questions but, since we considered the area of research to be too complex for a survey and since there were no archival records available that could answer our questions, we still decided that the right choice would be to use case study as our research strategy.

4.4 Sample selection

We decided to examine five small and medium sized distributors in the industrial supply sector. The reason why we choose small and medium sized companies was that few cases have examined how they perceive integrating e-business solutions (Morrell & Ezingear, 2002). The reason why we choose to investigate distributors in the industrial supply sector was that integrating e-business solutions is argued to offer them great opportunities but the adoption rate is still low (Per Svensson, personal communication, 22 April 2003).

Our supervisor, the Vice president of Endorsia.com International AB, was very helpful in our search for suitable companies. He was familiar with the industry and could give us contact information to several possible distributors. The final selection was based on their expressed objective to collaborate closely with trading partners, their competence level of e-business and geographic location.

To find the right respondents for our interviews we made sure that we talked to persons that had a thorough understanding of both economical and technical aspects and that would take part in the decision to integrate with a supplier. The Vice president of Endorsia.com International AB gave suggestions of suitable respondents for us. The distributors that we found to be the best suited for our study and that we then interviewed were G.A. Lindberg AB, Momentum Industrial Maintenance Supply AB, AB Sverull, Ravema AB and AB Östergötlands Maskinaffär.

4.4.1 G.A. Lindberg AB

G.A. Lindberg AB (G.A. Lindberg) aims to market products from leading manufacturers to the industrial sector. Cost effective solutions, high competency and good service shall make the company a natural partner in the industry. G.A. Lindberg supplies products for bonding, sealing, lubrication, gasketing, dispensing and industrial fluids. It also supplies silicone products for industrial usage. The company was founded in 1944 and has today its head office in Kista. It is now employing 39 people and has a turnover slightly above 100 MSEK.

The interview was conducted with Leif Quarsell, Marketing Manager at G.A. Lindberg, and Lennart Nilsson; IT Manager at Colly Company AB. Since the two companies G.A. Lindberg and Colly Company AB are trading different types of products they are not competitors, even though they are working in the same industry. They know each other well since they are situated in the same building and are members of Indutrade. Nilsson has also earlier been working as an outside IT-consultant for G.A. Lindberg and has therefore a good understanding of its systems and processes.

4.4.2 Momentum Industrial Maintenance Supply AB

Momentum Industrial Maintenance Supply AB (Momentum) was started in 1997 when four companies; Järn & Maskin, Sesemic, Kulan Väst and Kulan Syd, merged. It employs about 210 people and has a turnover of almost 500 MSEK. Momentum aims to be a market leader when it comes to satisfying needs of industrial components, service and partnership. The interview was conducted with the IT-Manager at Momentum, Kjell Hornby.

4.4.3 AB Sverull

AB Sverull (Sverull) was founded in 1970 as an authorized retailer for SKF and its bearings. The product range includes sealings, transmission products and lubrications today. Sverull aims to quickly be able to satisfy customers' needs of market leading products "around the axle" within the areas drive, seal, lubricate and lock. With the knowledge about its products and customers, the company aims to create value, good total economy and lasting relationships. Sverull has about 40 employees and a yearly turnover that slightly exceeds 100 MSEK. Our respondent at Sverull was Göran Hegestig, Purchasing and Logistics Manager.

4.4.4 Ravema AB

Ravema AB (Ravema) is a family business that was founded in 1912. The year 2002 it had a turnover of 360 MSEK and 90 employees. Ravema aims to provide the Nordic manufacturing industry with machines, tools and service so that its customers can benefit from an increased competitiveness and improved profitability. Ravema shall strive for satisfying its customer's expectations and demands in a healthy, businesslike and profitable way. The interview at Ravema was conducted with the controller Christian Granquist. He has 5 years of experience from the IT-industry as well.

4.4.5 AB Östergötlands Maskinaffär

AB Östergötlands Maskinaffär (Östgöta Maskin) was founded already 1893 in Linköping. The company employs 7 people today and has a turnover of 11 MSEK. It shall provide the manufacturing industry with quality products. Its guidelines are service and quality. Östgöta Maskin adjusts inventory levels and other services to its customers needs through a close cooperation. The respondent at Östgöta Maskin was the Managing Director, Claes Nyberg.

4.5 Data collection methods

For qualitative research there are six different forms of evidence for data collection. These are documentation, archival records, interviews, direct observations, participant observation and physical artefacts (Yin, 1994). The strengths and weaknesses of the different sources of evidence are presented in TABLE 4:2.

TABLE 4:2. Six sources of evidence: strengths and weaknesses (Yin, 1994, pp. 80)

Source of evidence	Strengths	Weaknesses
Documentation	<i>Stable</i> : can be reviewed repeatedly <i>Unobtrusive</i> : not created as a result of the case <i>Exact</i> : contains exact names, references and details of an event <i>Broad coverage</i> : long span of time, many events and settings	<i>Retrievability</i> : can be low <i>Reporting bias</i> : reflects (unknown) bias of author <i>Access</i> : may be deliberately blocked <i>Biased selectivity</i> : if collection is incomplete
Archival Records	(Same as for Documentation) Precise and quantitative	(Same as for Documentation) Accessibility due to privacy reasons
Interviews	<i>Targeted</i> : focuses directly at the case study topic <i>Insightful</i> : provides perceived casual inferences	Bias due to poorly constructed questionnaires Response bias Inaccuracies due to poor recall <i>Reflexibility</i> : interviewee gives what interviewer wants to hear
Direct observations	<i>Reality</i> : covers events in real time <i>Contextual</i> : covers context of event	Time consuming <i>Selectivity</i> : unless broad coverage <i>Reflexivity</i> : event may proceed differently because it is being observed Costs : hours needed by human observers
Participant observation	(Same as for Direct observations) Insightful into interpersonal behaviour and motives	(Same as for Direct observations) Bias due to investigator's manipulation of events
Physical artifacts	Insightful into cultural features and technical operations	Selectivity Availability

It is stated that one of the most important data collection methods for case studies is the interview (Yin, 1994) and it was also the method that we decided to use. An interview is both “targeted”, since it focuses directly on the case study topic, and “insightful”, since it provides perceived causal conclusions.

There will be an increased strength in the method if several data collection methods are used. This utilization of multiple sources of evidence is referred to as triangulation and makes the study more reliable (Yin 1994). We solely used interviews due to that there was hardly any documentation or physical artefacts available about the driving and inhibiting factors of integration. It was also very hard and time-consuming to obtain this kind of data from any type of observation.

The interview could be divided into two types, structured and focused interviews (Emory & Cooper, 1991). The structured interview follows a structured questionnaire is therefore best suited for surveys. The focused interview is better suited for complex subjects since it follows an interview guideline instead and promotes discussion by the respondent (Yin

1994). Since we considered our study to be complex we decided to use a focused interview.

There are two different ways of conducting the focused interview, i.e. by telephone interviewing or personal interviewing face-to-face (Emory & Cooper 1991). By comparing our research objectives with the strengths and weaknesses of each of these methods, presented in TABLE 4:3, we were able to make a choice on which type that should be used for our respondent.

TABLE 4:3. Comparison of survey methods (Emory & Cooper, 1991, pp. 339)

Type of interview	Strengths	Weaknesses
Telephone	<ul style="list-style-type: none"> Lower cost than personal interview Expanded geographic coverage without dramatic increase of costs Uses fewer and more highly skilled interviewers Reduced interviewer bias Fastest completion time Better access to hard-to-reach respondents through repeated callbacks 	<ul style="list-style-type: none"> Response rate is lower than for personal interview Interview length must be limited Illustrations can not be used Responses may be less complete
Personal	<ul style="list-style-type: none"> Interviewers can answer questions about the survey, probe for answers, use follow-up questions and gather information by observation Special visual aids and scoring devices can be used 	<ul style="list-style-type: none"> High costs Need for highly trained interviewers Longer period needed in the field for collecting data Follow-up is labour intensive Not all respondents are accessible or available Some respondents are unwilling to speak to strangers face-to-face Questions may be altered or respondents coached by the interviewers

To collect the data we decided to make first personal interviews and then follow-up interviews by telephone. The personal interview was chosen due to that it was very important to probe for answers and to explain issues about the topic discussed. It was also important to see the reactions of the respondents when answering or discussing a question, since the uncertainty or security was much easier to see when sitting down face-to-face. The personal interviews took on average two hours and the follow-up telephone interviews about 20 minutes.

4.6 Data analysis

The nature of qualitative data brings implications for its analysis. To be able to capture the richness associated with qualitative data they cannot be collected in a standardized way. The transformation of raw data into information requires that the data is disaggregated into meaningful and related categories that then can be rearranged and analysed systematically and thoroughly (Saunders et al., 2000).

Data analysis consists of three different flows of activity: data reduction, data display and conclusion drawing and verification. Data reduction is a part of analysing the data. It refers to the process of selecting, simplifying and transforming the data that appears on tape or in field notes (Miles & Huberman, 1984).

The second flow is the display of data. It is defined as an organised assembly of information that permits conclusion drawing. Narrative text is one way to display the information. However, it is bulky and poorly structured. A better way to display information is through matrices, graphs, networks and charts. Using these tools is a major avenue to qualitative data analysis and they are designed to assemble organised information in an immediately, accessible and compact form (Miles & Huberman, 1984).

The third stream of data analysis is conclusion drawing and verification. In this stage the researcher notes regularities, patterns, explanations, possible configurations, causal flows and propositions. By making a multi-case analysis a researcher can establish the range of generality of a finding or explanation and pin down the conditions under which circumstances this finding occur. There is a greater explanatory power and generalisability compared to single case analysis (Miles & Huberman, 1984).

We followed all these three steps in our analysis of the collected data. First, the data from each case was reduced in order to display it properly. The data was also verified both within the cases, by comparing them to the frame of reference, and across the cases, by comparing the cases to each other. During the cross-case analysis data was structured and shown in tables to simplify the comparison. In the compilation of our findings matrices was used to analyse the data and display it in a structured and compact form.

4.7 Quality standards

The ideal study should be designed and controlled for accurate measurement of the interesting variables. The design of the research procedures should be carefully planned to come to conclusions that are as objective as possible. The researcher should report, with complete frankness, weaknesses and estimate their effect on the findings. The quality of a scientific study can be evaluated from the validity and reliability concepts (Emory & Cooper, 1991).

4.7.1 Validity

Validity refers to “the extent to which a test measures what we actually wish to measure” (Thorndike & Hagen, 1969, pp. 5). When conducting a case study there are two concepts of validity that are relevant, external and construct validity (Yin, 1994).

External validity

An externally valid study can be generalized across persons, settings and times (Emory & Cooper, 1991; Zikmund, 2000). Case studies are generalised analytically; results are attempted to be generalised to theories, as opposed to statistically as surveys are (Yin, 1994). Basically external validity is a sampling question. The question is to what extent the results from the respondents can be transferred to a target population? (Zikmund, 2000)

Construct validity

Construct validity refers to the degree to which conclusions can justifiably be made from the operationalisation of the theoretical constructs. It is an assessment of how well the theories are translated into measures. The researcher must make sure that the selected measures do indeed reflect the specific area that is being examined (Yin, 1994).

Since we in our cases left much of the operationalisation to the respondents it was very important that they were knowledgeable. To examine the factors’ impact on a decision to integrate with suppliers we chose a four-degree scale, ranging from high impact via medium and low impact to no impact. We did not choose a scale with more levels because it would be hard to differentiate between the factors. Some would probably stand out either positively or negatively but the rest would be hard to separate.

4.7.2 Reliability

Reliability refers to “the accuracy and precision of a measurement procedure” (Thorndike & Hagen, 1969, pp. 5). A measure is considered reliable when similar results are obtained over time and across different situations. The cause of low reliability is therefore imperfections in the measuring process that affect the results differently each time a measure is taken. It was therefore important that we talked to the right person in each interview. Less knowledgeable persons may give different answers at different times to the same question (Zikmund, 2000).

4.8 Critique of methodology

The major error sources that may affect the validity and the reliability are the respondent, the situation, the interviewer and the instrument (Emory & Cooper, 1991).

The respondents

Even though respondents understand the questions they might give different answers at different times. This is because they may not know the real reason for their behaviour and can therefore not answer honestly. It is therefore very important to talk to the right person. The respondents may also give directly wrong answers deliberately. The reason is that they want to give the appropriate view of themselves or their company (Zikmund, 2000).

To make sure that the respondents were enough knowledgeable to be able to answer honestly we tried to make sure that we talked to the right persons. Our supervisor, the Vice president of Endorsia.com International AB, was knowledgeable about many of our responding companies and he helped us in our first contacts with them to find the right respondent. To allow the respondents to prepare for the interview as much as possible we also sent them our interview guide in advance.

The situation

Any condition that places a strain on the interview can have serious effects. Another present person can cause these strains. That person can distort responses by joining in, by distracting or by merely being present. Further, if respondents feel that their anonymity is not assured they may be unwilling to express certain feelings (Emory & Cooper, 1991). Another problem may be getting both the visible reactions and the subconscious motivations of the respondent (Zikmund, 2000).

During the interviews we did not want anyone else than the respondent to be present. We had however to make one exception with G.A. Lindberg. We could not interview anyone who was enough knowledgeable to answer all our questions. We therefore decided to have two respondents from different departments. We thought that they together would have the required knowledge. We also made it clear to all our respondents how we would handle all information and for what purpose we were collecting it.

The interviewers

The interviewer's role is very important in focused interviews. He/she must be highly skilled to be able to encourage the respondents to talk freely without influencing the direction of the conversation (Zikmund, 2000). The interviewers can distort responses by rephrasing or reordering questions. Preconceived notions can cause interviewers to interpret answers incorrectly. Inflections of voice and prompting with smiles, nods and so on may also affect the replies. It also involves data analysis errors such as errors caused by poorly organised data (Emory & Cooper, 1991).

To avoid this type of errors we recorded all interviews and discussed our impressions as soon as possible after the interviews. We also made complementing telephone interviews where we felt something was unclear or missing. As the data presentation was done we gave our respondents the chance to look through it and comment on it. This was done in order to minimise the risk that something was misunderstood or forgotten.

The instrument

The instrument can first of all be too confusing and ambiguous. It might for instance be in the form of complex words and syntax, leading questions and ambiguous meanings. Preconceived notions can also make interviewers ask the wrong questions. Questions should also be raised about whether all of the potentially important issues are examined (Emory & Cooper, 1991).

We used an interview guide as mentioned earlier. To minimize the above mentioned risks our supervisor, assistant professor at the Division of Industrial Marketing and e-Commerce at Luleå University of Technology, proof read the interview guide and gave comments on it. At the beginning of the interviews we wanted to make sure that the respondents began to find their feet. Therefore we started off with simple questions about their own organisation, then gave them a scenario where we explained the basics of integration of the procurement process using Application integration via the internet, before we continued with gradually more complex issues. We avoided leading questions as much as we could but if the respondent did not understand some subjects we had to give an example. We were also able to do a trial interview with the e-Business Development Manager at Ahlsell AB before we met with our first respondent. Since we were conducting the interviews in Swedish we also have to keep in mind the translation problem.

5 DATA PRESENTATION AND ANALYSES

In this chapter we present and analyse the empirical data gathered from the interviews. If nothing else is stated, everything that is presented is raw data from the interviews. We start off with the within-case analysis of G.A. Lindberg AB and then continue with Momentum Industrial Maintenance Supply AB, AB Sverull, Ravema AB and AB Östergötlands Maskinaffär. Finally a cross-case analysis is conducted.

5.1 G.A. Lindberg AB

Orders are usually sent through fax at G.A. Lindberg. The orders are first of all registered within the ERP-system. They are then printed, put in the fax machine and sent to the supplier. Order confirmations are received through fax and diverging data is registered in the system. In this case we will compare application integration via the Internet with sending orders via fax.

5.1.1 Drivers of integration

Important changes for G.A. Lindberg, which would be brought by the switch from traditional ordering via fax to an integrated procurement process, are simplified order routines and the elimination of the need of re-keying data. The procurement process would become faster and more reliable as order routines are automated and fewer errors are made. The time that G.A. Lindberg otherwise loses on time consuming order routines and error tracking could be used more wisely. This is exactly what theory (Attaran, 2001; Jun & Cai, 2003; Morell & Ezingard, 2002) argues as well.

“It is probably not possible for us to increase the efficiency by reducing the manpower but, the efficiency improvements allow the employees to focus more on other activities instead.” (The Marketing Manager at G.A. Lindberg)

Personnel at G.A. Lindberg can have several work tasks. If the procurement process is simplified they can put more effort into other activities. For instance, a dilemma today is that many of G.A. Lindberg’s customers buy four or five different products when they could buy ten to twelve. If the company would be able to save time, it could use some of it to promote these product categories. The new selling time would bring increased customer service as well as increased sales. Other than that, employees would be able to work more with analysis of the market changes and managing of the product register as well. This is precisely what research by Attaran (2001), Morrell & Ezingard (2002) and Murphy & Daley (1999) suggests. Further, a good understanding of the market would bring, as the researchers Attaran (2001) and Murphy & Daley (1999) argue as well, that G.A. Lindberg knows what products that should be kept in inventories and that the risk of running out of stock or buying products that it cannot sell is decreased. The inventory levels can as a consequence also be decreased.

In accordance with the theories presented by Attaran (2001) and Morrell & Ezingard (2002), G.A. Lindberg believes that the information flow would be faster and have a better quality if the systems are integrated. It would receive more accurate but also, more importantly, faster order confirmations from its suppliers than it does today with the fax. The time it takes before G.A. Lindberg receives the order confirmations can vary significantly from supplier to supplier. The company aim to register all the information but it is a very tough goal. If the information would be registered automatically instead the company would not miss as many changes as it does today. It could notify the customers about delays much earlier and also go back to the supplier and check what has gone wrong. The company can therefore improve its service levels. Due to a faster information flow and fewer errors, the number of contacts by phone and e-mail regarding faulty orders and missing order confirmations are decreased. The type of information exchanged through personal contacts would change from negative discussions to more value-adding positive discussions about for instance products or services.

G.A Lindberg AB can not see any of the benefits with VMI that Pohlen & Goldsby (2003) bring up. To start with, the company does not like the idea behind VMI, i.e. to give the suppliers insight into its inventory levels and sales figures. The company has at least two suppliers for many of its products which makes it a sensitive issue. Other than that, the company's core competence lays in its knowledge about the market. If this information is handed to the supplier G.A. Lindberg is afraid it will be losing business.

“At the same time as we are distributors we are also competitors to our supplier....If it is a big contract our supplier might feel it would be tempting to grab the contract themselves. We are therefore not especially enthusiastic when it comes to providing them with this information.” (The Marketing Manager at G.A. Lindberg)

VMI is however a new phenomenon for G.A. Lindberg and it is not easy to predict and understand the pros and cons.

G.A. Lindberg is today using web invoicing with some of its suppliers. Electronic invoices simplify the attestation procedures since they can be sent electronically within the company as well. To solely be able to send or receive invoices electronically does however not bring any important advantages. The invoices are today received electronically but still have to be printed and then matched against orders and incoming deliveries manually. The large efficiency gains can be reached when the matching as well is handled automatically by the system. The above is in accordance with the theories from Korper & Ellis (2000). As opposed to research by Attaran, (2001), Jun & Cai (2003) and Korper & Ellis (2000) whom argue that the cash flow would be improved, G.A. Lindberg believes it would not be affected. G.A. Lindberg wants to pay as late as it can, just as the suppliers want the money as soon as possible. Companies behave like this because they want as much interest as they can and they will not change their behaviour by integrating the systems. Electronic billing services might however simplify the control. It becomes

easier to supervise the cash flow in and out. There is however still uncertainties regarding how electronic invoices should be archived. Today paper invoices are archived.

The trading partner relationships are important to G.A. Lindberg. The company agrees with what research by Attaran (2001) which suggests that the increased collaboration between trading partners have a positive effect on the relationship. The change from fax to integrated processes would probably bring less personal contact between the distributor and its supplier but this is not seen as a problem. Morrell & Ezingear (2002) argue the opposite when they suggest that it is a problem for many companies. Many of the contacts that are taken today at G.A. Lindberg are negative contacts initiated by some kind of problem. The application integration would bring that more contacts are qualitative or positive contacts. As the processes are integrated between business partners and runs smoothly it is possible to improve the relationships with the customer as well. Since the employees at G.A. Lindberg has several work tasks, time that was earlier spent on non-value adding work can now be used for market research and activities that strengthen customer relationships instead.

G.A. Lindberg is uncertain whether there would be any macro benefits that turn into micro improvements. The company's suppliers would experience many of the efficiency improvements that G.A. Lindberg is experiencing. As opposed to what Attaran (2001) and Morrell & Ezingear (2002) write, the suppliers would even so not spend more time on taking care of customers. They would probably see new possibilities to decrease the cost for the selling organisation and therefore decrease the sales staff instead. The suppliers of G.A. Lindberg reason differently, since they have personnel that are working only with selling activities. The personnel at G.A. Lindberg can on the other hand have several work tasks. G.A. Lindberg's employees could therefore shift their focus to other activities instead if the procurement process is simplified. The company might however be able to negotiate better prices.

The external forces that might affect the decision to integrate applications, which Morrell & Ezingear (2002) brought up, are confirmed at G.A. Lindberg. A company can experience pressure from both competition and suppliers. Pressure to keep up with competition is the strongest force, but business partners can force each other to use different solutions as well. However, G.A. Lindberg states that it is important to listen to the partner and try to find win-win situations as Morrell & Ezingear (2002) argue as well. Otherwise it will not become as successful as possible. In order to increase its power in the supply chain, G.A. Lindberg has joined a European organisation for distributors of industrial goods and services called Indutrade. G.A. Lindberg has also experienced pressure from export/import legislation. The work to put together export/import reports can be simplified by the integration since it decreases the risk that the reports do not correspond.

5.1.2 Inhibitors to integration

As research by Hsieh et al. (2002), Jun & Cai (2003) and Morrell & Ezingear (2002) suggest, the largest technical problems is according to G.A. Lindberg the incompatibility between systems. To be able to integrate the procurement process some adjustments are required to the systems. The company does not have the required competencies itself and consultancy services are very expensive as Hsieh et al. (2002) argue. G.A. Lindberg will not be interested in integrating the procurement processes unless it can find a cheap standard product that allows different ERP-systems to exchange information.

The security issues that have been brought up in research (Jun & Cai, 2003; Morrell & Ezingear, 2002; Linthicum, 2000) are not seen as problems at G.A. Lindberg. The company trusts the Internet as information communication vehicle as long as there is some kind of encryption on the traffic. One important risk that exists in traditional ordering is that the order is lost among other papers at the supplier. This risk is eliminated if the processes are integrated, since the information is registered directly in the suppliers' ERP-systems.

The administration and maintenance is not as a big problem as Linthicum (2000) argues. Initially it might put some restraints on the organization as all larger projects do but after some time it will not require much resources.

Legislation is not seen as a problem as opposed to what Jun & Cai (2003) and Zekos (2002) argue in their research. This is just another way of sending information and there were no issues when companies changed from ordinary mail to fax. There is however a small question regarding electronic invoices and how they should be archived.

In accordance to theory (McLaren et al., 2002) the integration brings that G.A. Lindberg is forced to be more loyal with its suppliers since it is a resource consuming job to switch supplier. This is however not an especially important inhibitor since the company only would consider this type of solution with its most important suppliers as Zsidisin & Ellram (2001) suggest as well.

The corporate culture and cultural differences between companies can have a large impact as theory (Jun & Cai, 2003; Morrell & Ezingear, 2002; Zakaria & Stanton, 2003) suggest. G.A. Lindberg argue that companies have to be positive towards e-business in general and integration solutions in particular before the cross corporate integration can become a success. To integrate processes this way is a huge step for many organisations. It puts high demands on both the distributor and the supplier. It is much work in the beginning but also much to save in the long run. It must however function correctly on both sides before it becomes a successful integration. Trading partners have to change their perspective. They can no longer only look to their own best. They have to look at what is best for both partners.

"When we are forced to systemise our process, we will find a lot of garbage since all weaknesses become so much more apparent. This will bring that we will have very much to do the first months after the integration. The system will not work until both ours and our supplier's processes are cleaned up. When this is done the system will run smoothly." (The IT-Manager at Colly Company AB)

Cultural differences between companies can have negative as well as positive impact. It is important that both trading partners are ready. To create an understanding of the benefits of application integration, it is important that both partners are fully aware of how the change would affect their situation. The two organisations' maturity has to be aligned as Zakaria & Stanton (2003) also state.

The corporate culture is built during a long period of time. G.A. Lindberg started to use EDI 15 years ago, but it is just recently that it has begun to appreciate it and use it to its full extent. It is not only management that have to understand and support integration. It is equally important that the personnel are given this understanding. The behavioural and organisational changes that the application integration brings are important inhibitors as Attaran (2001) and Jun & Cai (2003) suggest. Employees are reluctant to every change. Everything that is new is dangerous and many will probably be afraid of losing their job as well. To neutralise the anxiety they have to become aware of the positive sides of integration. They have to be aware of both the aspects that affect them in their daily work and the aspects that affect the company in general. Management have to make sure employees are aware of that processes are integrated to simplify future growth, not to decrease manpower. This is however a process that takes time. Employees are not easily convinced. Since application integration via the Internet is a rather new phenomenon and there are not many known success cases, it is a very big step to take. Some examples of successful integration would make the change much easier to conduct.

As research by Jun & Cai (2003) and Morrell & Ezingear (2002) suggest management has to have a good understanding of the benefits and costs that is brought by the integration of processes. Management would not spend money on a solution they do not fully understand or see any value in. It is important to show numbers of what it would cost and how much that could be saved. G.A. Lindberg is not a company that would jump on a new solution first. The company prefers to wait until most of the start-up bugs are fixed, but when that has been done it is willing to take it under consideration.

G.A. Lindberg confirms what Morrell & Ezingear (2002) bring up in their research; the company would respond positively to benefits which consider revenue and costs. G.A. Lindberg is afraid the start-up cost will end at six figure amounts. To justify this type of project the benefits have to be described in monetary terms and this is hard. The operational benefits can be estimated by comparing the new process to the traditional but compared to the initial cost they are relatively small. It is therefore important to take more strategic benefits into consideration as well. These are however very hard to value. How should for instance a quality improvement be valued?

“Management does not see that the saved time could be used to improve other parts of the organisation. In the end it always comes down to how much our profit would increase. Management is very focused on invoices and the cost of a solution. You often accept a bad solution as long as you do not get an invoice. They only respond positively to decreased costs or increased revenue.” (The IT-Manager at Colly Company AB)

To see strategic benefits it requires that management allow themselves to trust their thoughts and feelings. Otherwise integration will cost more than it tastes.

5.2 Momentum Industrial Maintenance Supply AB

Momentum uses automatic fax, i.e. orders are registered in the ERP-system and then automatically sent to the supplier through fax, for most suppliers. The company has however implemented EDI with some of its largest suppliers. It has some experience of VMI as well; SKF’s solution Optima is currently up and running between the two companies. Momentum also gathers price and availability information from an e-marketplace. In this study we will compare application integration via the Internet with automatic fax.

5.2.1 Drivers of integration

The information itself that is sent directly between the two integrated systems is not especially interesting. What are interesting are instead how the information flow would be simplified and the effects that this could have on the organisation. The traditional order process with the automatic fax is time consuming and consists of several error sources. The order information is first entered in the Momentum’s own ERP-system, sent via the automatic fax and then re-keyed in the supplier’s ERP-system. As the order is registered, an order confirmation is sent by fax back to Momentum and registered manually. The process is slow and the risk that errors are made increases each time the information is re-keyed. Momentum confirms what Attaran (2001), Jun & Cai (2003) and Morell & Ezingear (2002) bring up in their research. By integrating the procurement process with its supplier the information flow would be automated and the need for re-keying data eliminated. Momentum would therefore benefit from a faster and more accurate information flow and a reduction of errors.

Less time have to be used for defensive work; chasing missing order confirmations or checking faulty orders. The timesaving allow Momentum to spend more time on value-adding activities as Attaran (2001) argues. The company would first of all focus on delivery monitoring. When orders are delayed, Momentum would many times be able to notify the customer at an earlier point than before. The company could then contact the supplier to see what has gone wrong and also focus on quality improving activities to a

larger extent than it can today. The aim is always to focus more on customer activities, but in a wider and longer perspective it can bring a decrease in manpower as well.

Momentum does however not experience much of the improved order routines and reduced paperwork that Attaran (2001), Jun & Cai (2003) and Morell & Ezingard (2002) suggest. Since the orders are sent with the automatic fax, these improvements are seen at the supplier. The supplier does not have to re-enter the data or send the order confirmation since it is done automatically. The efficiency improvement would therefore not be as important for Momentum as it would for its supplier.

“We would on the other hand be able to increase our demands on the supplier when it comes to order confirmations. We would like to have an order confirmation within two hours after the order has been sent. This is however very hard to achieve by fax. The fax is time consuming and there is always a risk that it is out of paper or that a paper with an order is lost somewhere at the supplier.” (The IT-Manager at Momentum)

If the systems were integrated, the response would be sent back as soon as the order is registered. Momentum could therefore react immediately if there is no response from the supplier.

VMI would reduce the administrative costs and could perhaps also decrease inventory levels as Pohlen and Goldsby (2003) argue. Since the supplier register the order itself, Momentum does not have to spend as much time supervising inventories and registering orders as before. Momentum would also be given a higher priority from the suppliers since they have taken on a larger responsibility. Momentum has noticed that it has not experienced the increased inventory levels as it would if the ordering was handled traditionally. It might however at the same time be hard to set the parameters and as a consequence there is a risk that Momentum buys too large quantities. VMI is however not suitable for all procurement. Momentum is sometimes given the opportunity to buy large quantities at better prices and these purchases require traditional channels. Further, within the organisation there has to be a good understanding of the system and how it would work. There might otherwise be an uncertainty among personnel. It might be hard to get acceptance if there are any uncertainties regarding how it would work with the supplier's system registering the orders instead of an employee. Momentum does not see VMI as especially important at the moment. The company can still afford to have purchasers generating the orders.

As Korper and Ellis (2000) suggest, electronic billing services would reduce the handling costs for invoices at Momentum. It is however not enough to simply receive electronic invoices. Benefits can be seen when the invoices are registered automatically without any intervention from personnel. If the resource consuming matching between orders and incoming invoices and shipping notices could be eliminated as well it would bring large savings. The intervention from personnel would then only include supervision and attestation of faulty invoices. Momentum does however not see the improved cash flow

that Attaran (2001), Jun & Cai (2003) and Korper & Ellis (2000) suggest they should. Accountants should also keep up with the development. Companies still have to archive paper copies.

The increased level of mutual cooperation brings that the business relationships are improved, just as Attaran (2001) and Morrell & Ezingard (2002) argue. The integration does not damage the business relationship, but could on the other hand hurt personal relationships between employees at Momentum and its suppliers.

“People have a need for social contacts. Companies should use computers and integrated systems to handle everything that is strenuous but leave the rest to humans. There is still a lot of information that cannot be efficiently communicated electronically.” (The IT-Manager at Momentum)

If Momentum integrates its system with a supplier the company becomes somewhat more inflexible as McLaren et al. (2002) argue. A lot of time and resources have been put in the relationship but it is not seen as an inhibitor since the integration is built on mutual trust and believes that the companies can grow together as researchers (Zsidisin & Ellram, 2001) argue.

As Attaran (2001) and Morrell & Ezingard (2002) suggest, the integration of procurement processes would bring benefits for the supply chain that then could turn into improvements for each supply chain member. The supplier has more possibilities to increase its efficiency than Momentum has. If Momentum can help its supplier to increase their efficiency the company wants something in return. The close collaboration should be built on a better total economy for both partners and most companies would therefore be willing to give better prices and customer service. The distributor could increase the number of orders to the supplier and in turn expects better service. The support can be in the form of technical support or by looking at problems regarding logistics or packaging. There are however companies that would try to keep all efficiency gains within the corporate border as well.

Momentum confirms what Morrell & Ezingard (2002) bring up in their research about pressure from external forces. The forces that might affect Momentum come first of all from the competition but also from customers and, to some extent, suppliers. The objective with the integration would be to increase the efficiency to improve the competitiveness. Customers and suppliers are also trying to affect Momentum but how they are doing it varies. There are examples where companies only are trying to solve their own problems without paying any attention of their partners' situation as Morrell & Ezingard (2002) argue. On the other hand, the company has experienced cases where suppliers are trying to find win-win situations instead.

5.2.2 Inhibitors to integration

The largest technical problem according to Momentum; the incompatibility between different systems, is also brought up in research by Attaran (2001), Hsieh et al. (2002)

and Jun & Cai (2003) as very important. The incompatibility brings that huge resources are required to integrate them. It is too expensive to connect Momentum's interface with too many adapters or EDI-standards. It is important to find a common standard.

The administration and maintenance of the system would not be a problem as long as the service provider does not develop new versions that are not compatible with older ones. This is not in accordance with the theory presented by Linthicum (2000). The author states that this is an inhibitor.

The security is also a problem when doing business on the Internet as Jun & Cai (2003), Morrell & Ezingard (2002) and Linthicum (2000) all argue. Momentum always has to deal with the threat from viruses for instance. Communication point to point via the telephone network is more secure in that sense but the risk on the Internet is not overwhelming either. For example, the risk that a third-party intercepts the message is not an issue. Momentum cannot see any value in the information that would make it worth the effort.

Jun & Cai (2003) and Zekos (2002) bring up several legal issues that can inhibit integration between companies. Momentum does however not agree. There are no legal issues that inhibit the integration.

Momentum agrees with Zakaria & Stanton (2003) and Morrell & Ezingard (2002) when they state that the corporate culture as well as cultural differences between companies can inhibit the development of integration solutions between companies. There are suppliers of Momentum that have come far in their development and those that are not ready to integrate. In order to increase the awareness of these solutions, among the suppliers that not have come as far, Momentum tries to reason and explain why it is important.

The propensity to change among the employees of an organisation can be a very important inhibitor to a successful integration. The employees that are affected might not have the computer readiness or are afraid of losing their jobs. To deal with these problems it is crucial that the personnel are informed early about the change, how it affects them and why it is necessary. This is precisely what the research by Attaran (2001) and Jun & Cai (2003) suggest as well. It is important to give something in return when the employees are facing important changes. In this case the change bring that it is possible to eliminate boring routine work that does not add value. The employees can instead be given more stimulating work tasks as for instance different customer activities. Consequently it would probably not be too difficult to get acceptance from the employees in this case.

The conclusions of Jun & Cai (2003) and Morrell & Ezingard (2002) that management's role is very important, applies to the situation that Momentum is facing as well. First of all, management would never spend money on something they do not understand and see any value with. Further, it is also their task to make sure the idea is anchored among the employees. Management's attitude towards e-business solutions in general is positive at

Momentum, as long as it sees that the investment can be justified in terms of return on investment. Management also wants to see that there is a previous success story of the product before the decision to integrate is made. Momentum has had the possibility to use several solutions that it has turned down. It is wise to stay healthily critical to new solutions. Momentum has to be sure all promises made by the provider can become reality before it jumps on a new solution.

There is today a lack of known success cases. A few examples of successful application integration would decrease the initial step since it decreases the uncertainty to a large extent. In the past there have been investment that have generated too large development costs due to that the solution was not ready. It is however not too difficult to justify the project. It is possible to calculate what it takes to reach break-even with the increased efficiency. Estimation is made based upon the amount of transactions and the time saved from double data entry and error reduction. It is however hard to value benefits such as improved relationship with a supplier and increased levels of customer service. Theory (Morrel & Ezingard, 2002) argues that this could be an inhibitor to integration. When Momentum makes the decision it is both strategic and operational factors that are considered. However, the ones that are easy to put figures on and show actual savings are the benefits that is most important. What you could do in order to concrete improved customer service is to look at the improved delivery performance of the supplier and how it would affect Momentums performance towards their customers.

5.3 AB Sverull

Sverull's largest supplier today is SKF, which stands for about 55% of all orders. The orders to SKF are sent through the electronic marketplace Endorsia.com International AB. The process is not integrated and the orders are first entered in Sverull's ERP-system and then again at Endorsia.com. Order confirmations can be seen at the e-marketplace. The order confirmations have to be entered manually into Sverull's ERP-system. The rest of the orders are mainly sent through automated fax, i.e. orders are registered in the ERP-system and then automatically sent to the supplier through fax. Order confirmations are in this case received by fax. The ones that differ are then registered manually. In this study we will compare application integration via the Internet with placing orders at Endorsia.com.

5.3.1 Drivers of integration

Integration is suitable when it comes to straight re-buys. If Sverull would switch from a non-integrated procurement process, as with the e-marketplace, to an integrated procurement process, it would bring an improved information flow as well as improved order routines. It is however hard to fit everything that is outside the standards into the system. Special orders, e.g. when Sverull is interested in special products or new terms of delivery, still have to be handled through fax or phone.

The amount of information that is sent via the integrated systems is not affected. Nevertheless, the quality of the information is on the other hand improved due to the better order routines. Orders are today first registered in Sverull's own ERP-system and then again at the e-marketplace. The shift to an integrated procurement solution would bring that Sverull could save time and decrease the number of errors. This is because data only have to be entered once. The decreased number of errors would then again bring that time would be saved since less time has to be spent on checking faulty orders. This is in accordance with the theories presented by Attaran (2001), Jun & Cai, (2003) and Morell & Ezingear (2002). The saved time would allow Sverull to put more effort into other activities, such as delivery monitoring and customer service. Sverull would therefore be able to improve its service levels. Moreover, Attaran's (2001) and Morell & Ezingear's (2002) views about business relationships are shared by Sverull. The close collaboration, as integrating the procurement processes imply, would strengthen the relationships between Sverull and its supplier. Sverull could then be given a higher priority and therefore also better service from the supplier. Some of the saved time could also be allocated to increase the quality of the communications regarding special orders. The increased quality of the total information flow is brought up by Attaran (2001), Jun & Cai, (2003) and Morell & Ezingear (2002).

Further, if the purchasing personnel have much to do, there is a risk that orders that are put in the Sverull's own system one day might not be registered on the e-marketplace and sent to the supplier until the day after.

"The purchasing personnel have a hectic work environment. It is therefore possible that they do not have time to register the orders in both systems on the same day. We will therefore, after the integration, become a better and more secure distributor." (The Purchasing and Logistics Manager at Sverull)

Integrated systems can therefore, in some cases, decrease the lead-time. That integration brings better timeliness in the order routines could also be found in research (Attaran, 2001 and Morell & Ezingear, 2002).

Order confirmations are today often a problem. They can only be seen on the e-marketplace and if the supplier makes any changes, for instance on the delivery date, Sverull almost always miss them. The company does not notice anything until the due date has passed. Consequently, if order confirmations would be registered automatically in Sverull's ERP-system, the company would be able to increase its service levels.

It is not easy for a distributor like Sverull to decrease its inventory levels. Sverull is dependant on high service levels towards customers. What is most important then is to have the product in stock when the customer needs it. The company could have a product in inventory for two years before it is sold. Inventory levels will therefore in this case not be affected as the theory presented by Attaran (2001) argues.

Sverull has considered VMI but decided not to implement it. The company can see why suppliers want to use it. VMI would tie Sverull closer and allow the supplier to obtain valuable information about the demand. The company is enough dependent on some suppliers as it is today. Suppliers also assume that they are better at purchasing than their distributor. Sverull however believes that it has better or as good means to do it itself. The company wants its own “touch” since it has a better feeling for the fluctuations in demand and sees no reason to give the supplier information about its inventory levels. Sverull does not believe that any of its suppliers will use the inventory information in a way that is not beneficial for it today but the suppliers’ strategy and policy might change in the future. Once Sverull has given out its information there is no way back.

Sverull’s inventory levels would increase if it implements VMI. This is because its security stock has to be increased. This is not in accordance with Pohlen & Gatsby’s (2003) theories. They argue that buyers can benefit from decreased inventory levels since suppliers take on a big responsibility. The benefits with VMI are that Sverull does not have to send any orders. The company could therefore achieve a small timesaving. This time would however be used for monitoring and adjustment of the system. The order costs would therefore not decrease as it is described by Pohlen & Gatsby (2003).

“What benefits that could be achieved through VMI is dependant on how streamlined the own internal procurement process is. If you have a well functioning procurement department and procurement system there is no need to implement VMI. On the other hand, if our customers did not require as high service levels, we had high levels of bounded capital and we did not have issues regarding giving away information about inventory levels, VMI could be a good solution.” (The Purchasing and Logistics Manager at Sverull)

If Sverull would implement e-billing services it would lead to efficiency improvements. If the invoice was automatically registered and matched against orders within Sverull’s system, much boring routine work would be eliminated as the research by Korper & Ellis (2000) suggest. It means that if Sverull continue to be in a growth phase, it recently bought another company, the company could take over some of its subsidiary’s administrative work. The cash flow improvement, that is brought up by researchers (Attaran, 2001; Jun & Cai, 2003; Korper & Ellis, 2000), are marginal and therefore not considered by Sverull. To implement the matching of orders, invoices and shipping notices would probably be a big investment, but at the same time there is much to save in the long run.

Attaran (2001) and Morell & Ezingear (2002) argue that the buyer could receive higher levels of service due to the efficiency improvements that the supplier experiences. Since the supplier already is integrated, in this case through the e-marketplace, it does not experience any efficiency improvements. The supplier would however still be interested in assisting its distributor. If Sverull can improve its service levels against its customers it would bring more income to the supplier as well. Sverull would therefore be given a

higher priority and consequently given a better service. The researchers further argue that the buyer could negotiate better prices. Its supplier relationship has been built during a long period of time and Sverull value other aspects as improved service levels higher than price in this particular case.

Morell & Ezingear (2002) argue that competition as well as business partners can drive the integration forward. The most important external factor that could affect Sverull is competition. The company has to be in the technological frontier in order to stay competitive in the future. Sverull does not want to be a first mover, but are interested to join the race once someone else has taken care of the large initial costs and these are down to a bearable level. Suppliers can however also affect the company to some extent but there still have to be a win-win situation.

5.3.2 Inhibitors to integration

Companies will always face technical problems when they are integrating procurement processes. Sverull does however not see it as an important inhibitor.

“Once you have decided to integrate you just have to solve the problems as they emerge.” (The Purchasing and Logistics Manager at Sverull)

Lack of technical knowledge or capabilities is according to Attaran (2001) one of the largest inhibitors to integration. Sverull states that the more complicated and deeper the integration becomes, the more technical problems will occur. The company does not have the required competencies to implement a solution but can on the other hand buy these services from a consultant. Sverull does not see it as an important inhibitor to lack the required competencies. The cost for the consultancy service is bearable as well. As opposed to what Linthicum (2000) argues; the resources that the administration and maintenance of the system require are not seen as an especially important inhibitor either.

Research by Jun & Cai (2003), Morrell & Ezingear (2002) and Linthicum (2000) argue that security issues have to be handled in some way. Sverull reasons that if the service provider of the integration solution encrypts the information and sends it through secure channels Sverull would trust it. Those that are interested in the information would however be able to obtain it anyway if the value of the information is high enough. Sverull can however not see the value in this type of information.

Sverull does not see any of the legal issues that are brought up by Jun & Cai (2003). There is no difference regarding contracts if you send the information with a file or with paper. Sverull values close relationships that are based on mutual trust. If it experiences problems with a supplier they will work together to find a solution. This is accomplished without involving legal terms.

Sverull is striving to achieve a corporate culture where everyone is open to changes as for instance integration solutions. This process is long and full of obstacles. To change a corporate culture is a long process that has to be kept alive over time. Everything that involves computers also involves people. It is a person that uses the system on the other side of the screen. The computer readiness and propensity to change of the employees is therefore very important. Some might also be afraid of losing their job. This feeling might be another cause for the reluctance to change. There might exist differences within the organisation and it is up to management to even out these different levels of maturity as Jun & Cai (2003) argue.

“However, some people can never be convinced. The slightest change is like jumping 2.50 meters in high-jump.” (The Purchasing and Logistics Manager at Sverull)

To come to the point where all levels within the organisation is positive towards the change, management has to inform and educate the personnel in order to make them realise why it is important for the organisation. This is what Attaran (2001) bring up in his research as well.

The cultural factors that inhibit the development of integration solutions between organisations are differences in e-business readiness. Both partners have to achieve a certain level of readiness or maturity before they can benefit from integration. The level of maturity amongst many of Sverull’s suppliers is low. Some have recently started to use e-mail and are not interested at all. Some other are on the other hand interested but cannot since their ERP-systems are too old to handle the integration. These differences can be seen between countries and regions as well as industries. In Sweden it is often a question about age and education. Older people that are not grown up with computers and the Internet might be more reluctant to this type of changes than their younger colleagues.

The reason why Sverull has become as open to e-business solutions as it has is due to a few important factors. The company is a family business. The owners are aware of many of the benefits that e-business can bring and also open to new ideas as long as they can be economically justified. Top and middle management has a good dialogue and the company’s short decision-making channels is another important factor. The employee that has been driving issues regarding e-business in general and integration particular at Sverull is the Purchasing and Logistics Manager. The reason why the company see integration of procurement process as such an important issue is competition. The competition is tough already and will only get tougher in the future. To stay competitive and keep earning money Sverull has to increase its efficiency.

The purchasing organisation at Sverull has sometimes a tough and stressful job and the changes would consequently not be greeted as negatively as theory (Jun & Cai, 2003) suggest. The company does not talk about the integration in terms of decreasing the number of personnel but simplifying future growth. Sverull would become more efficient

with the current manpower. If only the company is able to provide the personnel with this information and at the right time it would probably break down most of the barriers and make them stop worry about losing their jobs. They would then instead see the change as an improvement of the work environment. This is possible since it would mean less time spent on boring routine work. The employees would probably feel threatened as Attaran (2001) suggests, but no more than Sverull can handle it with information and education.

By automating the communication process there is a risk that the business relationships are hurt due to decreased levels of personal contacts according to Morrell & Ezingear (2002). The number of personal contacts between Sverull and its suppliers will not be affected especially after the integration. Both business partners would still have a vast need of communication through traditional channels. The business relationship would therefore not be affected negatively. As McLaren et al. (2002) argue it would be harder to switch supplier after integrating the procurement processes. This does however not affect the decision to integrate due to market characteristics. For instance, Sverull and its largest supplier SKF have had a close business relationship for more than thirty years. SKF is also more or less the only supplier Sverull would consider on the market.

As Morrell & Ezingear (2002), Hsieh et al. (2002) and Jun & Cai, 2003 state, these projects cost a lot of money and the full integration of IOS with an organisation's internal system and with those of its trading partners is a very difficult task that requires much resources from Sverull. The company has recently finished an EDI project against one of its customers and is now about to implement application integration with one or maybe two suppliers. The company takes one step at the time and does not rush the integration development. Implementing e-billing services could be the next step, but Sverull cannot afford to take too many steps at a time.

It is not hard to see the benefits and costs of moving from traditional to integrated procurement processes. It can however be, as Morrell & Ezingear (2002) argue, difficult to put numbers on them. Most operational benefits are relatively easy to value while strategic are much harder. The operational improvements can relatively easy be valued by estimating the amount of non-value adding work that could be eliminated. When it comes to strategic improvements, even though they are harder to value they have an as big impact on the decision as operational. The only difference is that feelings and beliefs become more important. If Sverull would decide to integrate it would not be because of a few operational improvements but the solution as a whole.

Sverull is, in accordance with theory (Zsidisin & Ellram, 2001), only interested in integration projects towards larger suppliers. To integrate procurement processes with smaller suppliers will not be possible until there is a cheap and uncomplicated integration solution available on the market. The health of the economy in general also has a big impact. It is hard to finance larger investments when the economy is down.

5.4 Ravema AB

Ravema is using EDI connections with some of its tool suppliers. The company is however using e-mail or fax for most of its procurement. The order confirmations are then received through e-mail or fax. In this case we will compare application integration via the Internet to fax.

5.4.1 Drivers of integration

A transition from traditional ordering via fax to integrated procurement processes would bring more efficient and accurate procurement process. This is precisely what Attaran, (2001), Jun & Cai (2003) and Morell & Ezingard (2002) suggest. Much non-value adding work would be eliminated. When the order process is integrated, purchasers do not have to print orders and put them in the fax. Much monitoring of the order and order confirmations could also be eliminated. Purchasers do not have to check whether the fax has arrived or when it will be delivered since the information would be registered automatically in the ERP-system. Today's order confirmations received through e-mail or fax. To check all, including those that are correct, and update the ERP-system when needed is resource-consuming work. Ravema's current system can receive order confirmations, but it is too expensive to implement today due to that the system is too old. The company has to change system before it would consider these additional improvements. In its contacts with customers it is essential to know the correct delivery dates. Its customers are manufacturers that have to know exactly when the product arrives. Their production schedules are carefully planned and it costs a lot of money if a machine stands still.

Further, it is always more likely that something goes wrong with manual processes. The risk that errors occur, increase each time the information is re-keyed. This is what theory (Attaran, 2001; Jun & Cai, 2003; Morell & Ezingard, 2002) state as well. If the procurement process becomes more systematic, it forces Ravema's work routines to be better organised to. It might therefore be possible to eliminate other sources of errors than the re-keying of data as well. It could for example be that the purchaser procures the wrong quantity or type of product. Prices will also become more beneficial if the procurement is planned properly.

By decreasing the number of errors, the company is able to spend more time on other more important activities. Ravema can however not say exactly what it do with the saved time. The company does not have persons that are working solely with order entering. Which activities that would be affected are dependant on the type of product that is bought and whose work that is simplified. When it comes to straight re-buys it is possible to either submit bills to customers earlier to improve the cash flow or, as Attaran (2001) argues, focus more on customer activities.

VMI would not bring any particular benefits since Ravema does not have inventories to any larger extent. The company acts as a sales channel instead of a distribution channel. Consequently it does not handle the good at all in most cases.

Korper & Ellis (2000) argue that e-billing services reduce the handling costs. If Ravema would receive electronic invoices that could be matched against orders and incoming deliveries automatically, it would bring less unplanned buys. This is because the company would have to structure its procurement process better. The demands on both system and organisation would increase. In accordance with theory (Korper & Ellis, 2000), the handling of invoices would also be much more efficient if the matching of orders and invoices would be done automatically. Attestation procedures could also be simplified since invoices could be sent through e-mail instead of ordinary internal mail. The numbers of e-invoices however have to be high before any concrete changes or benefits can be seen. E-billing services are not fully implemented at Ravema today due to weaknesses in the ERP-system. Until the company has implemented a new ERP-system it is not interested in e-billing services.

Ravema's suppliers would benefit from similar efficiency improvements as their distributor is. These improvements would however not affect Ravema's decision to any larger extent. The supplier would experience a more accurate, reliable and faster information flow, i.e. a more effective sales process. Ravema hopes but is not certain that its suppliers would use the timesaving towards their customers to maintain and perhaps improve the customer service levels. There is a risk that the supplier keeps all improvements within its organisation. This is what theory (Morell & Ezingear, 2002) states as well. The researchers also argue that customers could obtain better prices. Ravema is uncertain, but states it might be possible to receive better prices if other distributors did not have similar solutions. The benefits obtained depend on the current relationship and how the contract is negotiated between the two parties.

Ravema's business relationship with the supplier would be strengthened by the integration as Morell & Ezingear (2002) argue. The integration requires a close cooperation, which then in turn implies an improved relationship. The relationship would also be improved if for instance product specialists from the two business partners would get more time to discuss solutions with each another.

Morell & Ezingear (2002) argue in their research that companies could experience pressure from competition as well as business partners. Ravema has not felt any direct pressure from business partners, but competition is however an important driver. The competition is tough and it is important to be cost effective.

“It may be dangerous not to integrate with your suppliers and customers. Competition will become tougher and tougher and if you do not integrate processes it will be hard to survive. Still, you have to see the whole picture; all

parts of your business have to be in place for an integration to work out ok.”
 (The Controller at Ravema)

The company’s strategy has always been to work towards these types of solutions with suppliers as well as customers.

5.4.2 Inhibitors to integration

The largest technical inhibitor is according to Ravema that companies have internal information systems that are of both different type and different age. As Hsieh et al. (2002) Morell & Ezingard (2002) and Jun & Cai (2003) argue, the connection of different information systems is a difficult task that would require huge resources. If systems have different age it will also add to the incompatibility between systems. Older versions might not even have the necessary features to allow integration. The lack of a common standard for information sharing is, as researchers (Hsieh et al., 2002; Morell & Ezingard, 2002 and Jun & Cai, 2003) argue, also something that increases the amount of required resources from Ravema. The administration of the system might be an inhibitor to integration according to Linthicum (2000). Ravema does however not consider it as a too important issue. The cost for administration and maintenance of the system is dependant on how many products that are removed and added to the product-register.

When doing business on the Internet, security is a problem according to the researchers Jun & Cai (2003), Morrell & Ezingard (2002) and Linthicum (2000). They argue that a company’s most valuable asset, its information, could easily come in the hands of a competitor. Ravema does not agree because of the nature of the information. The products that Ravema is trading with are valuable but they are at the same time standardized and have very limited area of usage.

The legal issues, for instance terms and conditions concerning shipment and location of delivery, that are brought up by Jun & Cai (2003) are not seen as problems at Ravema. To the company the integration only imply a new way to send the same type of documents.

Management’s attitude and belief concerning integration solutions is very important as Morrell & Ezingard (2002) argue. The management at Ravema is positive and have a good understanding of e-business in general. However there might be individuals at trading partners that do not agree.

“For some people it is hard to see the total cost of a good, including the costs for procurement. There are individuals within many customer organisations that do not see the total cost but only the price tag. If the cost for procurement is not concreted you get this type of reasoning. This is one of the reasons why some are reluctant towards integration solutions.” (The Controller at Ravema)

The IT-department at Ravema would, while integrating, function as a mediator between the company and the supplier of the integration solution. It would be the IT-department's responsibility to anchor these new ideas among personnel. Jun & Cai (2003) write that the integration of procurement processes require both organisational and behavioural changes that can be an important inhibitor to integration. At Ravema the employees' attitudes have to be aligned with the new process. It would however probably be tough to get a response for how the IT-department reasons. For the IT-department at Ravema it is obvious that the process should be as systematic and exact as possible. Nevertheless, other employees in the organisation do not necessary share this view. The progress towards integration solutions has consequently not been as fast as it could have been. In order to overcome this inertia Ravema has to start talking openly about the change very early. The whole organisation has to be aware of why the change is important.

The employees also greet different projects differently. The differences in attitudes towards the change are dependant on the effects it would have on the organisation. When a project only aims to increase the internal efficiency it has been hard to implement. But, when it aims to increase the sales volumes as well, the attitudes among staff have been much more positive at Ravema.

Cultural differences between companies are as important as inhibitor as the own corporate culture. None of the trading partners will be able to see all positive aspects from the integration unless both are ready for it. This is what the research by Zakaria & Stanton (2003) suggests as well.

According to Morell & Ezingear (2002) relationships might be affected negatively by automating the communication process since it would bring less personal contacts. The number of routine contacts between Ravema and its suppliers, regarding for instance orders, does however not affect the business relationship. It is because these contacts are often non-value adding discussions about for instance missing order confirmations.

It is today very costly for Ravema to switch supplier of a certain product. The cost would, as McLaren et al. (2002) state as well, increase even more by integration. On the other hand, this is not seen as an important inhibitor at Ravema since the company only would consider integration solutions with strategic or long-term suppliers. This is in accordance with the theory (Zsidisin & Ellram, 2001). Integration implies a close collaboration and the trading partners have to come to a solution where both are satisfied.

Morell & Ezingear (2002) argue that many companies require very tangible levels of project justification and so does Ravema. The researchers further state that it is difficult to value the benefits that would be brought by integration. Ravema states that it is not especially difficult to value the operational benefits. Ravema would estimate how much the company would save in order process time. Variables would be the number of orders and order rows, how orders are handled today and what it costs per hour. The strategic benefits such as better relationships with suppliers and improved customer service are

however much harder to value. It is very difficult to value these improvements and Ravema does not know exactly where the timesaving could be used. Since the company cannot value the improvement, these factors would not be as important as operational benefits when it is time to make the decision. Strategic benefits would instead be viewed upon as a bonus if everything works out fine. The estimated value of the operational benefits of the integration would be weighed against the time and resources that is required from Ravema as well as the cost for the integration.

5.5 AB Östergötlands Maskinaffär

AB Östergötlands Maskinaffär's (Östgöta Maskin) orders are mainly sent through web shops and electronic marketplaces. The company is also familiar with VMI even though it does not use it today. The largest supplier with around 35% of transactions is SKF. Orders that are destined to SKF are sent through Endorsia.com International AB, an electronic marketplace. The orders are first entered in the ERP-system and then again at the e-marketplace. The suppliers that are connected to Endorsia.com are integrated with the e-marketplace. Order confirmations can be seen on the e-marketplace directly after the order is registered. If it differs from the original order it is manually registered in Östgöta Maskin's ERP-system. In this study we will compare application integration via the Internet with the e-marketplace Endorsia.com.

5.5.1 Drivers for integration

Today personnel are spending much of their time on entering orders into both Internet solutions and its own system. Östgöta Maskin has three employees that are responsible for their own product areas. Their responsibilities include procurement, supplier relationships and sales. The timesaving, that stem from not having to enter orders twice and the error reduction, convey that more focus can, in accordance with Attaran's (2001) suggestions, be directed towards customer service and sales activities. The company could prioritise such activities as helping the sales persons out on the field, submit tenders and delivery monitoring.

Application integration via the Internet offer great potential for Östgöta Maskin. If all the information goes straight into its information system, the order handling would become much easier and better as research (Attaran, 2001; Jun & Cai, 2003; Morell & Ezingear, 2002) argues. Especially the timeliness in delivery would be improved and as theory (Attaran, 2001; Morrell & Ezingear, 2002) argues this is very important. Delivery dates are sometimes changed after the order has been sent because the supplier for instance is running out of stock. Since Östgöta Maskin only can see the order confirmations on the e-marketplace, there is always information within the ERP-system that is not updated. The company is consequently seldom aware of changes. Östgöta Maskin might not be aware of a delay until the good does not arrive on time.

“Having correct and up-to-date delivery times on order row is very important for us. To be able to offer our customers good timeliness in delivery is an important competitive advantage.” (The Managing Director at Östgöta Maskin)

There are many distributors on the market that offer similar goods as Östgöta Maskin. To be able to differentiate itself the company have to offer other values than just the core product. According to Attaran (2001), the greatest value from integration could be reaped from improved competitiveness.

Östgöta Maskin has been thinking about implementing VMI. The company believes that it would decrease the order cost, give a timesaving in the order process and therefore also generate more time for sales activities. The inventory would also be better optimised and have a lower value. These benefits could be found in research by Pohlen & Goldsby (2003) as well. The economic benefits could be seen rather quickly. Östgöta Maskin’s procurements are today based on experience and a good portion of feeling. VMI offers more advanced means for calculating the point of order than the company uses today. Östgöta Maskin’s purchases are not especially structured and the procurement would after implementing VMI be managed in a better way. Negative aspects of VMI could be that companies fear they will give up the control of the purchasing and that suppliers gain access to important information. This is however not an issue for Östgöta Maskin. The company wants to achieve a close cooperation with its suppliers and does not adress the information as sensitive.

Östgöta Maskin is solely using paper invoices. Benefits reaped from e-billing services are according to Korper & Ellis (2000) that it enables the presentment and posting of bills on the Internet and that it reduces handling costs. If Östgöta Maskin only would receive a text file that was not registered in the ERP-system, it would mean that much paper handling would be removed. If the ERP-system would automatically match the electronic invoice against orders and incoming deliveries as well, a lot of time could be saved. How much time that could be saved or where the time should be used instead has not been considered.

The efficiency improvement that the supplier experiences could bring that the distributor is given better prices. This is in accordance with research (Attaran, 2001; Morrell & Ezingear, 2002), which argues that consolidated purchasing practices can lead to benefits for the whole supply chain that then turn into improvements for each member.

“The supplier will earn more money and become healthier by integrating. If they become stronger they can develop better products and improve their sales activities. This is of course good for us as an distributor.” (The Managing Director at Östgöta Maskin)

Since the supplier in this case already is integrated via the e-marketplace Östgöta Maskin would not experience any short-term benefits such as improved service levels or prices. However, the company argues that if it ties itself up even more and thereby shows that it wants to do business with the supplier and if Östgöta Maskin's sales increase it will be in a better position when negotiating for better prices and service from the supplier.

Competition is an important driver. Östgöta maskin has to become faster, better and more exact in the procurement process in order to gain more sales time.

“We should do everything as simple and automatic as possible and therefore I also want to integrate as much as possible. Everybody in the organisation should be involved in the sales process. It is from the sales we make money and the more time we save from integrating the procurement process, the more we will sell.” (The Managing Director at Östgöta Maskin)

A factor that encourages adoption is pressure from business partners and/or competition (Morrell & Ezingard, 2002). All these drivers are also seen at Östgöta Maskin. The margins will continue to decrease and the company must therefore find other ways to increase revenue. The suppliers also push Östgöta Maskin to increase the level of integration. The company sees this as something positive and states that it would probably not integrate if suppliers were not putting pressure on the company. The company wants to integrate but would otherwise not find the required time and resources.

5.5.2 Inhibitors to integration

The fact that there is no common standard for information exchange is a strong technical inhibitor. This issue is also bought up in theory (Hsieh et al., 2002; Jun & Cai, 2003). However, Östgöta Maskin is not too concerned about technical issues themselves. If the solution provider states that application functions it will. It is only a question of how much it would cost and the time the implementation would take. As researchers (Hsieh et al., 2002; Jun & Cai, 2003) argue services that are required from outside consultants are very expensive. The internal information system has previously been an inhibitor to further integration but Östgöta Maskin's new ERP-system is now up and running and functions better and better. The new system is prioritised at the moment but when the company feel it can take the next step it will. It is now just a matter of time before EDI-based VMI is implemented towards one of its suppliers. The company is also interested in sending order files to its suppliers, at least to the most transaction intensive and e-billing services will also be considered in the future. Still, Östgöta Maskin have to take one step at a time due to the lack of time and resources. As researchers (Hsieh et al., 2002; Jun & Cai, 2003) argue the integration of IOS with an organisation's internal system and with those of its trading partners is a very difficult task that requires enormous resources. The company is afraid the cost for integrating for example the order confirmations into the ERP-system would be very high. However, most of the changes to the new system have so far been relatively easy and cheap.

All solutions that involve computers have a tendency to not only simplify but also create additional work. This is however not an inhibitor since the workload from double data entry is removed. Administration and maintenance of the new system would only cause a small concern and is therefore not an as important inhibitor as theory (Linthicum, 2000) argues.

According to theory (Jun & Cai, 2003; Morrell & Ezingear, 2002; Linthicum, 2000) message content could be modified, the sequence altered and repudiation of message origin or receipt are possible. Östgöta Maskin has however no concerns regarding sending orders via the Internet.

Östgöta Maskin has not considered the legal issues brought up by theory (Jun & Cai, 2003; Zekos, 2002). The company have to make sure the supplier does not send too many products when using VMI. There could also be some legal issues when using e-billing services but otherwise there are no legal problems.

The integration would decrease the numbers of personal contacts between Östgöta Maskin and its suppliers. This development was seen already when the company started to use its suppliers' different e-procurement solutions and is not seen as a big problem today. Some personal relationships might be hurt but the business relationship would not be affected negatively as opposed to what Morrell & Ezingear (2002) suggest. The increased switching cost that is brought up by McLaren et al. (2002) is not an issue for Östgöta Maskin either. If the company ties up itself it tells the supplier that it intends to conduct business with that particular supplier in the future as well. Östgöta Maskin is not interested in chasing new suppliers since some of them might offer better prices on some products. Other aspects as customer service are more important. Moreover, it costs a lot of time and money to switch supplier even before the integration.

The cultural issues brought up by research (Morrell & Ezingear, 2002; Zakaria & Stanton, 2003) are also strong inhibitors at Östgöta Maskin. The suppliers maturity are many times lower than Östgöta Maskin's and to even out these differences the company tries to talk and discuss these issues with them as frequently as possible.

As Östgöta Maskin installed its new ERP-system personnel were sceptic in the beginning. Even though the personnel at Östgöta Maskin are young and have grown up with computers they felt insecure when they did not have anything real in their hands. The company further stated that handling papers are a source of errors and tried to educate and explain how the system works and why it is important. Management argued that it did not matter if the information is showed on a screen or on a paper. According to Attaran (2001) the attitudes and beliefs among the employees must be realigned with the new process. It is important to get the employees engaged and involved and openly communicate with them to teach them about the new technology and answer their questions (Attaran, 2001). Östgöta Maskin does not consider the attitudes among employees to be an inhibitor to the integration despite its experience earlier.

“Once the company has decided to integrate, the personnel simply has to do what they are told and after a while when they have worked with it for some time they usually come to appreciate it.” (The Managing Director at Östgöta Maskin)

This is not in accordance with theory. As seen research (Zakaria & Stanton, 2003) suggests that there is a need for cultural awareness and sensitivity to how culture affects the adoption of new technologies.

Management’s attitude could be an important inhibitor to integration. These views are found in theory (Jun & Cai, 2003) as well. It is not always that integration issues are put in the first room. Östgöta Maskin sells and delivers maintenance products and the largest part of the total cost for the customer is the cost for raw material. Their employees spends many hours negotiating better prices since it is seen as more important than lowering the cost for procurement. However, there are dangers in this reasoning as Linthicum (2000) argues; companies have failed to address performance of processes until it is too late. The management at Östgöta Maskin has however a good understanding of the need for e-business solutions such as integration. The margins are already low and will continue to decrease and it is therefore important to find other ways to increase revenue.

It is easier for Östgöta Maskin to concrete costs than it is to concrete benefits from integration. The operational improvements are easy to see and could probably be calculated or estimated also but this is not necessary for the company. It is not hard to see the strategic or long-term benefits either, but it is on the other hand very difficult to concrete them. The company does therefore generally not calculate as much as it reasons when a new system is evaluated. Even if Morrel & Ezingard (2002) argue in their research that uncertainties regarding benefits and costs are, especially among SME, important inhibitors to integration, this is consequently not a problem at Östgöta Maskin. Management have a good understanding of both benefits and costs and would be willing to invest money in a similar solution even if they did not know exactly how much that would be saved or earned. The fact that it takes some time before the company can benefit economically from the integration since several of the mentioned benefits would not be realised in the short-term is therefore not a problem either. Other than that the costs are also as long as they are reasonable not a problem either.

5.6 Cross-case analysis

In this part of the analysis we will compare the five cases against each other. Our two empirical research questions will be analysed across the cases.

5.6.1 Which are the drivers of integration?

TABLE 5:1. Importance of operational factors

Operational drivers	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
No need of re-keying data internally	High	No	High	High	High
Decreased handling of paper entering orders and receiving order confirmations	High	High	No	High	No
Less time used for error handling	High	High	High	High	High
Improved order confirmations	High	High	High	High	Medium

All cases except Momentum state that the removal of double data entry when registering the order has a high impact on the decision to integrate. It has a high impact because double data entering is time consuming as well as an important source of errors. The reason why Momentum does not agree is that it has already eliminated the need of re-keying data internally.

Decreased paper handling is an integration driver. It is a driver first of all in the cases where fax is used but also to some extent automatic fax. It is a driver when using of automatic fax since the handling of order confirmations could be simplified significantly. Where e-markets are used for procurement the need for paper handling has already been removed.

In all our cases the error handling is time consuming. The elimination of the need of re-keying data and decreased paper handling would bring that less time is required for these non-value adding activities.

The responding companies agree when it comes to order confirmations as well. Other than the decreased administrative cost, simplified handling of order confirmations for both the distributor and the supplier, the distributors could also improve their service levels. Since the information is sent and registered directly at both trading partners, it is of better quality and the distributors would not miss updates to the same extent as today. They would consequently be able to inform their customers about delays much earlier than they are today.

TABLE 5:2. Importance of VMI

VMI drivers	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Decreased order cost	No	Medium	No	No	Medium
Decreased inventory levels	No	Low	No	No	High

G.A. Lindberg, Sverull and Ravema do not see any benefits with VMI. At G.A. Lindberg and Sverull it is because they do not like the idea behind VMI. The information is considered too sensitive to give up. Sverull feels it is enough dependent on its suppliers as it is and also believes it can handle the procurement better or as good as the supplier. The company has a better understanding of fluctuations in demand than the supplier. Ravema states that it does not suit them as a company since it does not have any significant inventories. The company operates more as a sales channel where the goods go directly from supplier to end customer.

It is therefore only Östgöta Maskin and Momentum that think VMI could decrease the order cost. Östgöta Maskin is also the only company that believes it could lower its inventory levels significantly by using VMI. Momentum argues it is possible, but is at the same time afraid that it could buy too large quantities since it is hard to set the parameters. Differences in how systemised the procurement is at Sverull and Östgöta Maskin could perhaps explain their different views on VMI. Sverull has a well-organised order process and a well-functioning internal information system. Östgöta Maskin on the other hand procures more on feeling and routine in a less systemised way. Another explanation might be their different view on whether the information is sensitive or not. Östgöta Maskin does not have any issues about giving up this information and is consequently positive to VMI.

TABLE 5:3. Importance of e-billing services

E-billing drivers	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Decreased administrative costs	High	High	High	High	High
Improved cash-flow	No	No	No	No	No

All cases show that handling invoices automatically is an important driver. To solely receive electronic invoices does however not bring any important advantages. According to G.A. Lindberg and Ravema the registration process of the invoice and the attestation procedure could be simplified. All cases do agree that the important benefits cannot be seen until the matching of invoices, orders and shipping notices is handled automatically as well.

The cash flow is not affected in any of the five cases. G.A. Lindberg argues that it is because the company wants to pay as late as it can, just as the suppliers want the money as soon as possible. Companies behave like this because they want to obtain as much interest as they can and they will not change their behaviour because the systems are integrated. The reason why our study shows that the cash-flow is not improved, as opposed to what theory suggests, might be that we are only discussing incoming invoices.

TABLE 5:4. Importance of strategic factors

Strategic drivers	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Improved customer service	High	High	High	High	High
Improved supplier relationships	High	High	High	Medium	High
More efficient handling of orders at the supplier	Low	Medium	No	Low	No
Improved service from suppliers due to timesaving	No	Medium	Low	Low	Low
Lower prices from suppliers	Low	Medium	Low	Low	Low

To improve customer service is viewed upon as very important by all five cases. The saved time that stem from improved order routines and error reduction would to a large extent be used to improve customer service levels. Improved order confirmations would also increase service levels since the distributors would be able to inform customers much earlier about changes in delivery time.

Improved supplier relationships are also considered very important in all five cases. All companies also believe that increased collaboration with suppliers strengthen the relationship. G.A. Lindberg, Momentum and Ravema further argue that they would have more time for qualitative discussions instead of routine contacts. Östgöta Maskin argues that it is very dependant on some suppliers and having a good relationship is therefore very important.

How efficient the order handling process is at the supplier is dependant on the current level of integration on the supplier side. Sverull's and Östgöta Maskin's suppliers are already integrated through an e-marketplace and would consequently not see any efficiency improvements. In the other cases the suppliers can experience significant improvements, but G.A. Lindberg and Ravema are uncertain whether they would be given something in return or not. Both distributors argue there is a risk that the supplier does not share the benefits that they make from the integration. G.A. Lindberg believes that their supplier would use most of the efficiency improvements to decrease the manpower instead. The supplier would consequently not be able to provide better service.

When it comes to prices G.A. Lindberg and Ravema argue that there is a small chance that they might be lowered. Momentum is a bit more positive and believes that it would be given both better service and prices. Momentum states that integration should be built on a better total economy for both partners. If it is, both partners would be willing to give something back to its trading partner. Even though integration at Sverull and Östgöta Maskin do not help their suppliers to increase efficiency, they think that they in the long run would experience both service improvements and be able to negotiate for better

prices. If Sverull could increase its service levels against its customers and thereby also sales, it would bring more income to the supplier as well. The supplier would therefore be willing to give Sverull a higher priority. Östgöta Maskin argues that if it ties itself closer to the supplier it would be in a better position to obtain both better service and prices.

TABLE 5.5. Importance of external drivers

External drivers	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Pressure from competition	High	High	High	High	High
Pressure from suppliers	Medium	Low	Low	No	Medium

Pressure from competition is a very important driver for integration in all five cases. Competition drives the distributors to increase their efficiency in order to improve their competitiveness. As Östgöta Maskin argues; the margins on the products will continue to decrease and therefore companies have to find other ways to increase revenue.

All companies except for Ravema have experienced pressure from suppliers. Sverull, G.A. Lindberg and Momentum state that it is important to find win-win situations where both parties are satisfied. This is also what most suppliers are aiming for. Östgöta Maskin sees the pressure as positive and states that the integration probably would not happen if the suppliers were not putting pressure on the company.

5.6.2 Which are the inhibitors to integration?

TABLE 5.6. Importance of technical inhibitors

Technical inhibitors	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Incompatibility across systems	High	Medium	Low	High	Medium
Issues regarding security risks	No	No	No	No	No
Administration and maintenance	Low	Low	Low	Low	Low

The responding companies are not completely agreeing when it comes to technical inhibitors importance. For four of the companies, G.A. Lindberg, Momentum, Ravema and Östgöta Maskin, technical issues are strong or very strong inhibitors. The incompatibility between different systems and lack of technical knowledge within the own company bring that expensive systems and services have to be acquired externally in order to allow companies to communicate electronically. Sverull is however not especially worried. The company mentions that it will experience technical problems, but once the decision to integrate has been made, the problems just have to be solved. The cost for an outside consultant can be justified by the achieved benefits.

Security is not seen as an issue at any of our responding companies. The Internet is secure enough to function as information communication medium. The risk that a third party intercepts the message is low. Momentum, Sverull and Ravema says it is because they cannot see the value of the information.

All companies agree that administration and maintenance are not an especially important inhibitor to integration. Momentum states that it is not an issue as long as the system provider does not develop new versions that not are compatible with older ones.

TABLE 5:7. Importance of issues regarding legislation and relationships

Legislation & relationship issues	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Legislation issues	No	No	No	No	No
Decreased personal contact	No	No	No	No	No
Increased switching costs	No	No	No	No	No

All companies agree when it comes to legislation as well. Legal issues are not inhibitors in any of the five cases. G.A. Lindberg and Ravema explain that it is the same information and same documents; it is just a new way of sending them. Neither of the respondents are experts in legal issues. If there is an individual with more competence within this area in the group where the decision to integrate is made it is possible that it could inhibit the integration.

The number of personal contacts between G.A. Lindberg, Sverull, Ravema and their respective suppliers would not be decreased since non-value adding contacts only would be replaced with value-adding discussions. Momentum and Östgöta Maskin do however argue that personal relationships could be hurt. This is however not an inhibitor. The business relationship would still be improved due to the increased cooperation mentioned earlier.

All companies agree that the switching costs would increase if processes were integrated. They also agree that it is not a problem. The reason why is that the integration solution would only be considered with strategic suppliers where both partners can grow together. Switching suppliers is costly even before the integration.

TABLE 5:8. Importance of cultural issues

Cultural inhibitors	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Management's lack of understanding and support for e-business solutions	Medium	Low	Low	Low	Low
Internal corporate culture	High	Medium	Medium	High	No
Human Resource Management issues	High	Medium	Medium	High	No
Cultural differences between the two business partners	Medium	Medium	Low	High	Low

According to all our responding companies it is very important that management is aware and has a good understanding and support for e-business solutions. For Momentum, Ravema, Östgöta Maskin and Sverull lack of understanding is not an inhibitor. Managers are well aware and open to this type of solutions. Momentum also mentions that it is up to management to make sure that the idea is anchored among personnel and they would not spend money if they do not fully support such solutions. Management at G.A. Lindberg is however a bit more reluctant. It took the company more than a decade to fully benefit from EDI. The differences of managements understanding reflect the companies' experience of e-business.

The corporate culture and the information and education that the employees require before the integration are inhibitors to all companies except Östgöta Maskin. The attitude and beliefs among the personnel are inhibitors that have to be aligned with the new process. Even though the work practises would be improved after the integration, it is likely that the change would meet resistance since the propensity to change often is low among employees. A positive attitude is important, since the chances of a successful integration then increases. Much information and education is required and the earlier the better. It takes a long time to affect the corporate culture. The companies state that it is important that everyone that is affected knows exactly how the change would affect them and why it is important for the organisation. Östgöta Maskin is the only exception from this reasoning. If the company decides to integrate the procurement process it would force the solution on the employees even though they are reluctant. They will learn to appreciate it after they have used it for some time.

Ravema and Momentum also mention that if the company could give something in return it might be easier to get acceptance. In this case it might be that the personnel do not have to spend as much time on boring routine work or there will be an increase of orders. Then the employees see that the efficiency improvements will not lead to a decrease of personnel. A small difference can also be seen between Momentum/Sverull and G.A. Lindberg/Ravema. The change would be bigger at G.A. Lindberg and Ravema since they are still using paper based ordering. The change would not be as big for companies that register orders in an e-marketplace, since they are used to paperless ordering.

Cultural differences between companies are important inhibitors to integration in the cases where the ordinary or automatic fax is used i.e. Ravema, G.A. Lindberg and Momentum. The cultural factors that inhibit the development of integration solutions between organisations in all these cases are differences in e-business readiness. Both partners have to achieve a certain level of readiness or maturity before they can benefit from integration. Also, companies need to change their focus and look outside their own company borders in order to see the needs and benefits of integration of their business partners. An example is Momentum that argues that a better handling of the orders at the suppliers will lead to improved delivery performance that then will bring benefits to Momentum. If both the supplier and the distributor reasons like this it decreases the inhibiting impact.

TABLE 5.9. Importance of issues regarding perceived costs and benefits

Perceived costs & benefits issues	G.A. Lindberg	Momentum	Sverull	Ravema	Östgöta Maskin
Difficulties to concrete costs	Low	Low	Low	No	Low
Difficulties to concrete operational benefits	Low	Low	Low	No	Low
Management's lack of ability to see strategic benefits	Low	No	No	Low	No
Difficulties to value strategic benefits	High	High	Low	High	Low

It is not difficult to concrete the costs of integration according to the respondents. The time and resources that is required internally from the companies and the costs for the solution provider or consultant are all easy to concrete. To concrete the operational benefits is neither seen as an important inhibitor. All cases state that it is relatively easy to calculate the number of orders and order rows, how orders are handled today and what it costs.

Management's lack of ability to see strategic benefits is not an issue in any of the cases. Management can see most of the strategic benefits that the integration would bring. G.A. Lindberg, Momentum and Ravema however argue that it is very difficult to value these benefits. These three cases require tangible levels of project justification. At G.A. Lindberg and Momentum management only respond positively to decreased costs or increased revenue. According to Ravema it is very hard to value strategic benefits since it is hard for the organisation to see what the timesaving could be used for or how much for instance an improved relationship would be worth. Strategic benefits would therefore in these cases not affect the decision to the same extent as operational. The companies see most strategic benefits and state that they are important for them. Since they need tangible levels of project justification it is an important inhibiting factor that they cannot value them.

Sverull and Östgöta Maskin argue that it is important to take strategic benefits into consideration as well, even though they are very hard to value. Strategic improvements at Sverull would have as big impact on the decision as operational. If Sverull would decide to integrate it would not be just because of the operational improvements, but the solution as a whole strategic benefits included. The company states that management would trust its thoughts and feelings regarding these benefits. Östgöta Maskin agree to a large extent. The connection between the timesaving that stem from eliminating the need of re-keying data, error reduction and strategic benefits, such as increased levels of customer service and improved relationship with the supplier, is obvious. The fact that the company does not know exactly how much it would save is not a problem.

6 COMPILATION OF FINDINGS

In this chapter we answer our three research questions and draw conclusions based on theory and our analysed data. The first research question was a theoretical question and it is therefore answered based on theory presented in chapter two. Our two empirical research questions are answered based on the analyses of our gathered data presented in the previous chapter.

6.1 How does the integration of the procurement process affect the purchasing procedures?

Moving from traditional ordering to integrated electronic ordering bring many changes to the purchasing procedures. The characteristics of the buying centre as well as the processes taking place within it are affected.

When it comes to the characteristics of the buying centre the size is first of all decreased. As information is easier to access and transfer, the number of functional levels involved in the procurement process is reduced. The level of managerial involvement also decreases. Software automation results in fewer levels of management actively engaging in each particular procurement episode since the employee's profile can be assigned pre-authorisations. As a result fewer people are required to make decisions. Further, the degree of participation from each buying centre member is increased due to the increased responsibility brought by the decreased number of members.

The processes within the buying centre are experiencing changes in the form of increased influence of technical personnel, decreased risk for conflicts and an increased coordination between departments. Technical personnel are likely to increase their influence since e-business tools can be used to obtain highly technical information about products. The information is perhaps only understood by the technicians. The increased information flow within the company brings both decreased risk for conflicts, since it builds understanding across the various departmental perspectives, and a better coordination between departments.

Streamlining the buying centre by reducing size, hierarchical and functional levels along with more informed participation implies faster and more efficient decision-making. Further, a better product selection and inventory management is brought by using highly knowledgeable technical personnel, reduced risk for conflicts and better coordination between departments.

6.2 Which are the drivers of integration of the procurement process?

Pressure from competition and suppliers are external drivers. Fierce competition forces distributors to increase their efficiency to survive. Pressure from competition is therefore a very important external driver. The pressure that distributors experience from suppliers varies significantly, but in most cases it is only a small driver. Usually the two business partners are looking for a win-win situation where the distributor is not forced to use a certain solution.

In order to structure and display the operational and strategic drivers we use a matrix. We have chosen to use possibility to concrete factor as the y-axis. Our study has shown that some factors do not always affect the decision to integrate, but could have a higher driving impact if they were easier to concrete. For the x-axis we have chosen the degree of importance to our respondents. After a generalisation of our cross-case analysis all factors impact can be characterised as either low or high.

Possibility to concrete factor	Easy	Decreased order cost by using VMI Decreased inventory levels by using VMI More efficient handling of orders at the supplier	No need of re-keying data internally Decreased handling of papers Less time used for handling errors Improved order confirmations Decreased administrative costs by using e-billing services
	Hard	Lower prices from suppliers Improved service from suppliers due to timesaving	Improved customer service Improved supplier relationship
		Low	High

Importance of factors

Figure 6.1. Importance of positive factors and the possibility to concrete them

All factors that can be seen in the matrix above are possible positive affects of integration of procurement processes. Generally it is however only the factors in the upper right quadrant that have a high driving impact on the decision. This is because small and medium sized distributors generally require tangible levels of project justification. Factors in the lower right quadrant could however be important drivers in some cases.

High importance and easy to concrete

All factors that have a high impact on the decision are placed in this quadrant. All operational improvements are very important drivers for small and medium sized distributors in the industrial supply sector. All our cases argue that non-value adding work costs a lot of money and many of the improvements that stem from integration

would reduce the time that otherwise have to be spent on such activities. Time-consuming order routines would be simplified and less time would have to be spent on correcting faulty orders.

Improved handling of order confirmations is another very important driver to distributors in this industry. The registration process is time consuming but other than that, if order confirmations are registered automatically, the system is updated earlier and the risk that companies would miss changes regarding delivery dates decreases significantly. Companies would therefore be able to increase their service levels, which is an important competitive advantage.

Electronic billing service is a strong driver. To be able to receive and register electronic invoices automatically would bring advantages as simplified registration process and attestation procedures. The important benefits are however reached when the matching between orders, incoming deliveries and invoices are handled automatically as well.

High importance but hard to concrete

In this quadrant are those factors placed that are very important but do not affect the decision in all cases since they are hard to concrete. First, the possibility to improve customer service levels has a high importance in all our cases. Especially the timeliness in delivery is seen as important. A close business relationship is also something that all cases value greatly and business process integration would improve it due to the increased collaboration.

Low importance but easy to concrete

These factors are easy to concrete but of low importance to distributors. To begin with a more efficient handling of orders at the supplier could be a driver when fax or automated fax is used, i.e. when the supplier's process is not automated. Whether it is important or not seems to depend on the current relationship with the supplier and the distributor's importance to the supplier. In most cases the distributors are not certain they would be given something in return from the efficiency improvements that the supplier experience and it is therefore not an important driver.

The companies' view of VMI differs. However, in most cases it is not an important driver. If VMI is a driver or not seems to be dependant on two factors; the degree to which the procurement process has been systemised and whether the information is considered sensitive or not. If the procurement process is not well organised and systemised and the company does not have any issues regarding giving up the information it could be a driver.

Low importance and hard to concrete

These factors are possible positive effects of integration but they are too small or uncertain to be taken under consideration for many distributors. Improved service from suppliers and lower prices are only of low importance for the distributors. The

distributors do not think they will benefit from the efficiency improvements that the supplier experience. These factors could however be small drivers in cases where the supplier does not experience any efficiency improvements as well. Some distributors believe that they in the long run would be given improved service and lower prices because they probably would sell more and become a more attractive distributor for their supplier.

6.3 Which are the inhibitors to integration of the procurement process?

In order to structure and display the inhibiting factors we use a matrix. The type of inhibitor is placed on the y-axis and the inhibiting importance on the x-axis. After a generalisation of our cross-case analysis all factors impact can be characterised as either low or medium.

Type of inhibitor	Technical	Administration and maintenance	Incompatibility across systems
	Cultural	Management's understanding and support for e-business solutions	Internal corporate culture Human resource management issues Cultural differences between the two business partners
	Perceived costs and benefits	Difficulties to concrete costs Difficulties to concrete operational benefits Management's lack of ability to see strategic benefits	Difficulties to value strategic benefits
		Low	Medium
		Importance of factors	

Figure 6.2. Importance of inhibiting factors

All factors that can be seen in the matrix are possible inhibitors to an integration of procurement processes. All factors affect the decision but those in the three right squares have the biggest inhibiting impact.

Technical inhibitors

The incompatibility between different systems and lack of technical knowledge within the own company bring that expensive services and systems usually have to be acquired externally. The administration and maintenance of the integration system is only a small inhibitor. Larger technical problems are less likely to occur once the system is up and running.

Cultural issues

Management's understanding and support of similar solutions have a significant impact. The competition in the industrial supply sector is tough and managers have been forced to find new ways to increase revenue. Management has therefore a good understanding and the inhibiting impact is low. Still, small and medium sized distributors do not want to be first movers. They need proof that it works and they argue that it is better to let other companies bear the often large initial costs and mistakes.

The corporate culture and the education and information that the employees require prior to the integration are important inhibiting factors. Even though the change would bring more stimulating work for the employees, all changes are intimidating. To achieve a culture where everyone is open to change is a process that has to be kept alive over time. Companies have to continuously and openly inform and educate their staff about why changes are important and how they would affect them. Companies have seen a decrease of the impact of this inhibiting factor when efficiency improvements come together with larger amounts of orders or more stimulating work tasks.

The cultural differences between two partners could have a significant inhibiting impact. The e-business readiness or maturity has to be aligned; both companies have to see and be able to reap the benefits from the integration. Companies cannot only look to their own best. They have to understand the other part's needs as well.

Perceived costs and benefits

The costs for implementing and using AI via the Internet can rather easily be calculated and uncertainty regarding costs is consequently a small inhibitor. Uncertainty is not a problem when it comes to operational benefits either. It is relatively easy for them to value the operational benefits in monetary terms.

The distributors see strategic improvements, such as better relationships and better customer service (See *Figure 6:1*), but due to that it is very hard to value them, managers have to trust their feelings and beliefs to a greater extent. Where managers require concrete numbers for all benefits this inhibiting factor has a larger impact.

7 IMPLICATIONS

In this section we give implications for the areas where this thesis can be useful. We provide implications for, theory, future research and providers of integration solutions.

7.1 Implications for theory

Our purpose and research questions were formed based on previous research. The research questions have served as a foundation for our investigation of small and medium sized distributors' driving and inhibiting factors for integration of the procurement process with their suppliers. We have discussed how the integration of the procurement process affects purchasing procedures. We have also explored five distributors in the industrial supply sector and their perception of what factors drive and inhibit the integration of the procurement process. Our findings have been described and used as a basis for our conclusions.

The contribution to theory from our thesis is based on both theoretical and empirical studies of the research problem. For the empirical studies five specific cases were investigated. Our findings do not completely comply with previous research. We have not found any new drivers or inhibitors, but many factors that have been brought up by earlier research do not affect our population. Our study can therefore serve as a foundation for further research. For instance, strategic improvements are only seen as bonuses and are not affecting the decision in many cases. The reason might be that we are investigating small and medium sized distributors. The investment might be big compared to the available resources. It is therefore very important to know exactly how much that can be saved and strategic improvements are very hard to value. Many strategic drivers also stem from operational improvements. The number of transactions might be too few for small and medium sized distributors to give any important strategic benefits. The Dotcom-crash might also have changed the way people perceive both positive and negative aspects of e-business solutions.

7.2 Implications for future research

This thesis has given us an insight into how small and medium sized distributors reason when considering application integration via the Internet with suppliers. The Internet itself is still a relatively new phenomenon and much research is still needed. Distributors are seldom brought up in research and there are also much more to investigate when it comes to application integration and companies' perception of benefits and costs. The dissimilarities between our and previous research also require more investigation.

- Would the result be the same on a larger sample of distributors?
- Would the result be the same for distributors in other industries?

- Would the result be the same for large distributors?
- Would the result be the same for manufacturing companies?
- We have only investigated Swedish distributors. Would the result be the same for distributors in other countries?
- What are small and medium sized distributors' driving and inhibiting factors for integration of the sales process with their customers?
- How could companies educate employees and create an understanding and feeling of participation among them to decrease the resistance that changes often convey?
- Companies respond positively to tangible project justifications. How could the solution provider help the prospect to value the integration?
- How does the current buyer/supplier relationship affect the perceived benefits and costs of integration of the procurement process?

The e-business development has the last years gone very fast and it would therefore be interesting to repeat the study some time from now. For example will these findings change as companies mature or change their focus to processes outside their own borders? An interesting fact is that even if all cases state that they would improve their customer service, none is certain that their supplier would do the same. Interesting questions are therefore why they believe as they do and if they are correct?

Several respondents also argue that they require tangible levels of project justification. Interesting is therefore that it seems as though negative aspects, as opposed to benefits, do not have to be measurable to affect the decision. For instance cultural inhibitors have an as big inhibiting impact as the more easily measurable factor incompatibility between different systems.

7.3 Implications for providers of integration solutions

An initial implication for solution providers would be to make sure that the right persons are contacted at new prospects. It is important that it is a person with a thorough understanding of all costs and benefits, but also the organisational and behavioural changes that the integration of procurement processes convey. The drivers and inhibitors need to be carefully explained for this person so he/she can apply them on his/her situation. It is to a large extent up to this person to then anchor the idea among other managers and decision makers.

An organisation is the most efficient when all co-workers, managers as well as employees, are aiming for the same objective. Providing customers with information and education material about the solution and what it implies would simplify the start-up and hopefully increase the propensity to change. It is important to show that the integration would bring for instance more stimulating work tasks or increased number of transactions.

Most SME do not have enough resources to engage in too many projects at the same time and therefore have to prioritize. It is therefore very important to approach prospects at the right time, i.e. when there are available resources to engage in a new project.

In the matrix in *Figure 6:1*, it is generally only the factors in the upper right quadrant that have a high driving impact on the distributors' decision. However, providers of integration solutions have to be aware of that the matrix's appearance can change from company to company. For example, VMI could be of higher importance in some situations as mentioned earlier.

Finally and probably most important, operational benefits are often better arguments than strategic benefits when discussions are held with prospects. Many organisations also need evidence that the solution works. Case studies that show efficiency improvements in actual numbers would be a strong marketing tool. It is also possible to show concrete numbers of increased timeliness in delivery, both from the supplier and to the end-customer.

REFERENCES

Articles

Angeles, R. (2000). *Revisiting the role of the Internet-EDI in the current electronic commerce scene*. Logistics Information Management, Vol.13, No. 1, pp. 45-57.

Attaran, M. (2001). *The coming age of online procurement*. Industrial Management and Data Systems. Vol. 101, No. 4, pp. 177-180.

Barber, N.F. (1997). *Will EDI survive?* Transportation & Distribution, Vol. 58, No. 9, pp. 39-45.

Barclay, D.W. (1991). *Interdepartmental conflict in organizational buying: the impact of the organizational context*. Journal of Marketing Research, Vol. 28, May, pp. 145-159.

Boyle, B.A. & Alwitt, L.F. (1999). *Internet use within the US plastics industry*. Industrial Marketing Management, Vol. 28, pp. 327-341.

Braganza, A. (2002). *Enterprise integration: Creating competitive capabilities*. Integrated Manufacturing Systems. Vol. 13, No. 8, pp. 562-572.

Dawes, P., Lee, D.Y. & Dowling, G.R. (1998). *Information control and influence in emergent buying centers*. Journal of Marketing, Vol. 62, No. 7, pp. 55-68.

Ding, D.Z. (1997). *Control, conflict and performance: a study of US-Chinese joint ventures*. Journal of International Marketing, Vol. 5, No. 3, pp. 31-45.

Disney, S. M. & Towill, D.R. (2003). *Vendor managed inventory and bullwhip reduction in a two-level supply chain*. International Journal of Operations and Production Management, Vol. 23, No. 6, pp. 625-651.

Ellram, L.M. & Cooper, C.M. (1990). *Supply chain management, partnerships, and the shipper-third party relationship*. International Journal of Logistics Management, Vol. 1, No. 2, pp. 1-10.

Fawcett, S. & Magnan, G. (2002). *The rhetoric and reality of supply chain integration*. International Journal of Physical Distribution & Logistics. Vol. 32, No. 5, pp. 339-361.

Haschka, J.M. (2002). *Will EIPP ever kill the wholesale lockbox business?* AFP Exchange, Vol. 22, No. 1, pp. 26-29.

Hasselbring, W. & Weigand, H. (2001). *Languages for electronic business communication: state of the art*. Industrial Management & Data Systems, Vol. 101, No. 5, pp. 217-226.

Hsieh, C., Yang, H. & Lin, B. (2002). *Roles of knowledge management in online procurement processes*. Industrial Management and Data Systems, Vol. 102, Nr. 7, pp. 365-370.

Iyer, G. (1996). *Strategic decision making in industrial procurement: implications for buying decisions approaches and buyer-seller relationships*. Journal of Business and Industrial Marketing. Vol. 11, Nr. 3, pp. 80-93.

Johnston, W.J. & Bonoma, T.V. (1981). *The buying center: structure and interaction patterns*. Journal of Marketing, Summer, pp. 141-156.

Jun, M. & Cai, S. (2003). *Key obstacles for EDI success: from the US small manufacturing companies' perspective*. Industrial Management and Data Systems. Vol. 193, No. 3, pp. 192-203.

Lankford, W.M. & Johnson, J.E. (2000). *EDI via the Internet*. Information Management & Computer Security, Vol. 8, No. 1, pp. 27-30.

Larson, P.D. & Kulchitsky, J.D. (2000). *The use and impact of communication media in purchasing and supply management*. The Journal of Supply Chain Management, Vol. 36, No. 3, pp. 29-39.

Lee, H.L., Padmanabhan, V. & Whang, S. (1997). *The bullwhip effect in supply chains*. Sloan Management Review, Spring, pp. 93-102.

Lim, B. & Wen, J. (2003) *Web services: an analysis of the technology, its benefits and implementation difficulties*. Information Systems Management. Spring, pp. 49-57.

McLaren, T., Head, M. & Yuan, Y. (2002). *Supply chain collaboration alternatives: understanding the costs and benefits*. Internet Research: Electronic Networking Applications and Policy Vol. 12, No. 4, pp. 348-364.

McQuiston, D.H. (1989). *Novelty, complexity, and importance as casual determinants of industrial buying behavior*. Journal of Marketing, April, pp. 55-79.

McQuiston, D.H. & Dickson, P.R. (1991). *The effect of perceived personal consequences on participation and influence in organizational buying*. Journal of Business Research, Vol. 23, No. 2, pp. 159-177.

Metts, G., Mora Monge, C.A. & Subba Rao, S. (2003). *Electronic commerce development in small and medium sized enterprises – A stage model and its implications*. Business Process Management Journal, Vol. 9, No. 1, pp-11-32.

Morrell, M. & Ezingear, J-N. (2002). *Revisiting adoption factors of inter-organizational informations systems in SMEs*. Logistics Information Management, Vol. 15, No. 1, pp. 46-57.

Murphy, P.R. & Daley, J.M. (1999). *EDI benefits and barriers: comparing international freight forwarders and their customers*. International Journal of Physical Distribution & Logistics Management, Vol. 29, No. 3, pp. 207-216.

Nurmilaakso, J-M., Kettunen, J. & Seilonen, I. (2002). *XML-based supply chain integration: a case study*. Integrated Manufacturing Systems, Vol. 13, No. 8, pp. 586-595.

Osmonbekov, T., Bello, D. & Gilliland, D. (2002). *Adoption of electronic commerce tools in business procurement: enhanced buying center structure and processes*. Journal Business and Industrial Marketing, Vol. 17, No. 2, pp. 155-166.

Peters, E.J. & Hogensen, A.J. (1999). *New directions for the warehouse*. Supply Chain Management Review Global Supplement, Spring, pp. 2-15.

Pohlen, T.L. & Goldsby, T.J. (2003). *VMI and SMI programs: How economic value added can help sell the change*. International Journal of Physical Distribution & Logistics Management, Vol. 33, No. 7, pp. 565-581.

Rasmusson, E. (1999). *Setting your sights in videoconferencing*. Sales and Marketing Management, Vol. 149, No. 10, pp. 106.

Ratnasingham, P. (1998). *Internet-based EDI trust and security*. Information Management and Computer Security, Vol. 6, No. 1, pp. 33-39.

Rudberg, M., Klingberg, N. & Kronhamn, K. (2002). *Collaborative supply chain planning using electronic marketplaces*. Integrated Manufacturing Systems, Vol. 13, No. 8, pp. 596-610.

Solomon, H. (1999). *Giga says companies saving fortune from e-business*. Computing Canada, Vol. 25, No. 34, September 10, pp. 11-14.

Tarn, J.M., Yen, D.C. & Beaumont, M. (2002). *Exploring the rationales for ERP and SCM integration*. Industrial Management and Data Systems, Vol. 102, No. 1, pp. 26-34.

Themistocleous, M. & Irani, Z. (2001). *Benchmarking the benefits and barriers of application integration*. Benchmarking: An International Journal, Vol. 8, No. 4, pp. 317-331.

Themistocleous, M. & Irani, Z. (2002). *Novel taxonomy for application integration*. Benchmarking: An International Journal, Vol. 9, No. 2, pp. 154-165.

Tingle, A. (2000). *EDI: antiquated or ready for rebirth?* Apparel Industry Magazine, Vol. 61, No. 1, pp. 58-60.

Vlachopoulou, M. & Manthou, V. (2003). *Partnership alliances in virtual markets*. International Journal of Physical Distribution & Logistics Management. Vol. 33, No. 3, pp. 254-263.

Webster, F.E. Jr & Wind, Y. (1972). *A general model for understanding organizational buying behavior*. Journal of Marketing, April, pp. 12-19.

Zakaria, N. & Stanton, J. (2003) *Designing and implementing culturally sensitive IT applications*. Information Technology and People. Vol. 16, No. 1, pp. 49-75.

Zekos, G. (2002). *Legal problems in cyberspace*. Managerial Law. Vol. 55, No. 5, pp. 45-102.

Zsidisin, G. & Ellram, L. (2001). *Activities related to purchasing and supply management involved in supplier alliances*. International Journal of Physical Distribution and Logistics. Vol. 31, No. 9, pp. 629-646.

Books

Chaston, I. (2001). *E-marketing strategy*. McGraw-Hill Professional Book Group, Maidenhead, Berkshire, UK.

Davydov, M.M. (2001). *Corporate portals and e-business integration: A manager's guide*. McGraw-Hill Professional Book Group, Blacklick, OH, USA.

Emory, W. & Cooper, D.R. (1991). *Business research methods*. R.R. Donnelley & Sons Company, USA.

Fredholm, P. (1995). *Elektroniska affärer – att införa och använda EDI*. AB Ystads Centraltryckeri, Ystad, Sverige.

Gadde, L.-E. & Håkansson, H. (2001). *Supply network strategies*. John Wiley & Sons Ltd, Chichester, West Sussex, UK.

Gartner Group (Pezzini, M.). (2001). *Application integration: Moving towards total business integration*. Paris Forum Rive Gauche, Paris, France.

Helander, J. (2000) *Supply chain evolution in the manufacturing industry*. Universitetsservice US AB, Stockholm, Sverige.

Kalakota, R. & Robinson, M. (1999). *E-business: Roadmap for success*. Addison-Wesley, Reading, MA, USA.

Korper, S. & Ellis, J. (2000). *The e-commerce book: Building the e-empire*. San Diego Academic Press, San Diego, CA, USA.

Kosiur, D. (1997). *Understanding electronic commerce*. Microsoft Press, Redmond, WA, USA.

Linthicum, D. (2000). *Enterprise application integration*. Addison-Wesley, Reading, MA, USA.

Miles, M.B. & Huberman, M.A. (1984). *Qualitative data analysis*. Sage Publications, London, UK.

Moriarty, R. (1983). *Industrial buying behavior*. Lexington Books, Lexington, MA, USA.

Persson, U. (1997). *A conceptual and empirical examination of the management concept supply chain management* (Licentiate thesis). Luleå University of Technology, Department of Business Administration and Social Sciences, Division of Industrial Logistics, 971 87 Luleå, Sweden.

Saunders, M., Lewis, P. & Thornhill, A. (2000). *Research methods for business students, 2nd edition*. Ashford Colour Press Ltd., Gosport, UK.

Thorndike, R.L. & Hagen, E. (1969). *Measurement and evaluation in psychology and education, 3rd edition*. John Wiley & Sons, New York, NY, USA.

Yin, R.K. (1994). *Case study research; design and methods: 2nd edition*. Sage Publications, Inc., Thousand Oaks, CA, USA.

Zikmund, W.G. (2000). *Business research methods*, 6th edition. Harcourt College Publishers, Orlando, FL, USA.

Websites

ebXML (2003). *About ebXML*. <http://www.ebxml.org/geninfo.htm>, (2003-09-09).

IBM (2003). *On demand glossary*.
http://www-3.ibm.com/e-business/doc/content/toolkit/glossary_e.html, (2003-09-10).

United Nations Commission on International Trade Law (1996). *UNCITRAL Model law on Electronic Commerce with Guide to Enactment*.
<http://www.uncitral.org/english/texts/electcom/ml-ecomm.htm> (2004-01-07).

Personal communication

Lennart Persson, Assistant professor at the Division of Industrial Marketing and e-Commerce at Luleå University of Technology, Supervisor.

Per Svensson, Financial Director at Endorsia.com International AB, Telephone interview 22 April 2003.

Sven-Olof Husmark, Vice president at Endorsia.com International AB, Supervisor.

APPENDIX A: INTERVIEW GUIDE

Please answer the following questions keeping in mind that: The purchaser puts the orders in the internal order system. The order is then encrypted and sent automatically over the Internet to the supplier in real-time. When the order is registered in the supplier's ERP-system an order confirmation is sent back automatically. It is also possible to receive electronic invoices as well as implement VMI (Vendor Managed Inventory; the supplier has access to information about inventory levels and sales figures and register the order for the distributor).

1. Could you briefly describe your purchasing practises today? How is an order sent?
2. What changes would be brought by the change from your purchasing practises to this type of electronic ordering?
3. How would the total information flow between your company and its suppliers be affected?
4. What effects would be brought by implementing VMI?
5. What effects would be brought by electronic billing services?
6. Could the integration bring any strategic benefits?
7. Are there any macro benefits in the supply chain that could turn into micro improvements for each participant?
8. Are there any external factors that could affect the decision to integrate with suppliers?
9. Could there be any technical obstacles to the integration?
10. Are there any legal issues that affect the decision to integrate with suppliers?
11. Are there any cultural issues affecting the integration?
12. Would the integration require any organisational changes?
13. Would the integration require any behavioural changes?
14. How would your trading partner relationship be affected?
15. How would the decision be affected by management's knowledge and attitude towards IT-solutions?
16. Are there any difficulties to concrete the costs and benefits?
17. Are there any other positive aspects of the integration?
18. Are there any other negative aspects of the integration?