

## **ICT's Role for SMEs Integration in Supply Chains– Efficiency and Effectiveness?**

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### **Abstract**

The potential of ICT (information and communication technology) has been a strong driving force for creation of the “extended enterprise” and the integration of the supply chains. This potential has however only partly been realised. Still data are transferred in a large variety of ways and compatibility between systems is low. ICT's role for the development within supply chains is getting questioned.

This paper is about SME and ICT and supply chains. The focus is on integration of the supply chain and changes in ICT solutions and whether these changes will hinder or create new opportunities for SME in their development of the customer or suppliers relationships in the supply chains. The study is based on a pilot study or interviews and a survey where 1200 questionnaires were sent to 600 firms to cover customer and supplier relations, and complementary follow-up interviews. From the study we are specifically interested in SMEs (small and medium sized enterprises) making use of ICT development by connecting to other firms in the supply chain.

While initial indications pointed to more hindrances than opportunities for SMEs to integrate to existing supply chains, ICT's role is of minor importance. The lack of resources and the type of systems that are preferred by the large firms can create severe constraints, but ICT is merely a resource among others that neither is special opportunity nor a hinder for close cooperation. SMEs' existence in supply chains is instead explained by extent of customisation and adaptation due to efficiency and effectiveness. Preferred ICT-solutions are of the type one-to-one and highly customized that facilitates supply chain integration.

(Acknowledgements are made to MagNet for the source of the survey.)

## Background

There is a basic need of information to be transferred both between and within firms in the supply chain. Information and Communication Technology (ICT) is seen as an important enabler in the creation of efficient and effective supply chains. The potentials of ICT have also over the last decade been strong driving forces to the development of the extended enterprise, which means integrated information and physical flows and high degree of collaboration between firms. New IT business firms saw great opportunities in ICT for their development. The ICT-solutions were also supposed to enable SMEs to internationalise with low entry barriers, to integrate directly with large international suppliers/customers, etc. Very little of this has so far been realised.

Even though vast investments have been made in ICT systems the last decade we are still far from the making use of the full ICT potential. One of the problems has been that the large firms seem to have focused on developing ERP systems internally rather than connecting the firms of the supply chain (Edwards, Peters and Sharman, 2001). In spite of the high costs invested in the internal systems there is still a lack of compatibility between firms and sometimes it has even become a hinder to the creation of compatible ICT system within the supply chain. This is especially true for small firms.

ERP-systems are widely used within firms, and with an EDI-application they facilitate information sharing between firms. However EDI, due to characteristics like high costs and static information, seems to be a connection directed to communicate with big customers or suppliers, without taking the situation of small firms into account. Thereby the transparency in the chain will be low. Another solution to share information is integration between different firm's ERP-systems via an external software-program. However, these integrated software solutions are normally both very large and costly and do not fit the smaller firms of the chain. A possible solution for the SME involvement in the supply chains is a web-based communication that is flexible to connect to without expensive integration programs. However, even though such solutions exist it seems that very few of these systems are put into use when integrating the supply chains.

In order to create an integrated supply chain and an extended enterprise the ICT solutions need to make use of solutions that makes it possible for smaller firms to join without too large investments and to develop in concert with the chain. Therefore we want to study how ICT is

used to connect firms in supply chains and how small firms can be part of such integration. The purpose of this study is to describe and analyse how ICT creates opportunities and constraints for SME to continue and develop deep and long term relationships to customers and suppliers when the supply chain is integrated.

### **Theoretical framework**

The theoretical framework will be based on network and supply chain management (SCM) literature. The focus will be on supply chain integration, and SME.

The supply chain is seen as a network of connected firms that together are fulfilling the promises to the final customers of the chain. Such a definition is also in line with many authors in the field of SCM (Christopher, 1998; Mentzer et al, 2001; Skjoett –Larsen, 1999a). The network approach is used to describe what we mean by deep and long-term relationships. These relationships between customers and suppliers are expected to involve not only the ICT exchange dimension but also the social, knowledge, physical, legal and economic exchange based on SME's resource dependence (Johansson & Mattsson, 1987; Pfeffer & Salancik, 1978). Information systems are described in terms of type of data exchanged and means of communication used.

The essence of supply chain management is integrated planning of activities across supply chains, including those of its suppliers and customers (Shapiro, 2001). Supply chains exist in all industries but the number of interrelated firms may vary as well as the degree of integration. Studies of supply chains have, however, to a large extent been focused on specific industries or from the perspective of a limited set of key firms in the chain (e.g. Bagchi & Skjoett-Larsen, Forthcoming; Harland et al, 2001; Hertz, 1999; Halley & Nollet, 2002).

The discussion of supply chain effectiveness in the supply chain management literature seems to be reserved to larger firms, which often have experience of ERP systems. A few of them have even achieved full-fledged automated communication both out- and inside firm, developing into extended enterprise (Edwards, Peters, Sharman, 2001). However, most firms have a mixture of different types of ICT-solutions, where large suppliers and customers are connected in real-time, via e.g. EDI, while others are connected through traditional means of communication. Traditional companies, who have limited internal integration and limited external ICT-integration, have a workflow with information that is less effective (McLaren, Head, & Yuan, 2002). SMEs that are less powerful are often kept out of the ICT integration of

the chain and its potentials that might turn out to give SCM a limited scope (Dainty, Millett, & Briscoe, 2001; Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia, 2001; Bask & Juga, 2001).

A major part of our sample consists of SMEs. The limited diffusion of ICT integration is seen in the focal firm and it's key customer and key supplier, often both relationships have unequal degree integration (Bagchi & Skjoett-Larsen, Forthcoming), which hint that in the larger context of the whole supply chain there may be the same diversity in degree of integration.

Supply chains with a powerful buyer downstream or balanced interdependence over the whole chain are most likely to manage integration (Cox, 2001). In an automotive supply chain there is buyer dominance from large automotive producers that often drive the change process (Hertz, 1999; Johnsen *et al*, 2000). Other supply chains are characterized by a mix of other power regimes (Cox, Sanderson & Watson, 2001) and there might be conflicting interests of ICT integration. The driver to integrate a supply chain is to increase the competitive power of the chain. The increased competitiveness is not equally shared among the contributors in the chain. A firm with weak relations to the supply chain may expect it as a risky investment to integrate without any indication to a fair profit sharing of potential gains (Johnsen *et al*, 2000). The relationship is an indicator to integrative propensity, and a downstream position in the supply chain is another (Hertz, 2001; Bagchi & Skjoett-Larsen, Forthcoming).

### **Method**

This paper is a part of a continuing study to explore ICT's role in SC with a group of fourteen ICT-researchers from different disciplines that will take an active part in the continuation of the study. In this preliminary work have quantitative and qualitative methods been deployed, and will be continued with further qualitative research. Parts of the quantitative findings were presented at the IPSERA conference 2003 in Budapest, but will briefly be presented both regarding method and initial findings as a platform for this papers qualitative method and findings.

### **Quantitative study**

Pre-understanding were gained through a pilot study consisting of seven interviews with practitioners; five industrial firms, one ICT provider, and the Chamber of Commerce that

launched a program aimed to help SMEs with information integration. This material has been used as a basis to understand the problem field and as an input to the survey.

At the IMP-conference 2002 another group of researchers – MagNet<sup>1</sup>, presented findings from a survey about supplier relations, and ICT-use. Their questionnaire were adapted to a Swedish context and complemented with questions regarded customer relations and ICT in the relations. The questionnaire was tested via several independent sources: Most of the questions have previously been used internationally with good results, after the translation several independent sources (colleagues and firms) evaluated the result regarding readability and content.

The survey was sent to 629 firms representing 1258 relations in all size-classes of firms. These firms were available in Jönköping International Business School's database because they are hosting firms to new students. These firms are geographically spread over the southern part of Sweden. The overall responses rate were 21,4 %, i.e. 22,4 % from relations regarding suppliers and 20,3 % from relations regarding customers. The survey consisted of approximately 140 questions, most of them answered on a five-point Likert-scale.

In the explorative analysis, utilized by SPSS, the firms were gathered in two groups. Approximately 75 % of the respondents were grouped as SMEs with less than 250 employees and the other group is large firms. The analysis was performed foremost by descriptive statistics to provide knowledge of the population, their ICT-integration, and their relationships. Especially similarities and differences regarding different size of firm, and relationship variables with different power aspects were taken into account. Relational aspects were measured via mean indexes, cross-tabulated towards firm size. ICT integration was cross-tabulated as a dichotomous variable towards firm size.

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<sup>1</sup> This survey is based of the MaGNet (Managing in Global Networks) survey, Ritter and Walter's version. The authors wish to thank Thomas Johnsen, Pete Naude, and David Ford (School of Management, University of Bath, UK), Sheena Leek and Peter Turnbull (Birmingham Business School, University of Birmingham, UK), Kristian Möller and Arto Rajala (Helsinki School of Economics, Finland), Jan-Åke Törnroos (Åbo University, Finland), Thomas Ritter (Copenhagen Business School, Denmark), Robert Salle (Lyon Business School, France), Achim Walter (University of Karlsruhe, Germany) and Dave Wilson (Penn State University, US).

## **Qualitative study**

The quantitative findings pointed to more similarities than differences regarding SMEs' and large firms' degree of ICT integration. And to gain deeper understanding of the results two batches of students', in total 42, collected information of their host companies integration. The relationship between students and host companies where on a continuing basis were the students visit and interview the companies eight times during their first two years as students. The empirical illustrations to this paper are grounded on 10-15 pages reports from 12 different companies. It is the students that have selected the companies that mean that the firms are a part of the quantitative study without any particular search criteria than that they are chosen by the students. The outcome resulted in five SMEs and seven large firms.

Reliability of the results is dependent on students' reproduction of the information given to them. Three to four students carried out the interviews at each firm and the firms have confirmed the reports' content. The information has been presented in a conference-like milieu. Student's aim with the report was to describe ICT integration of their host company towards suppliers and customers except one group that has concentrated their description on customer relations. Furthermore is some of the information in different reports not comparable to the others, which is marked with not available (na) in table 1 and 2. Students' knowledge about technical functionality of different ICT solutions is superficial and not included in any of the reports.

## **Initial Findings**

The quantitative study surveyed ICT integration and relations in many industries and in size-categories, from micro to multi, of firms.

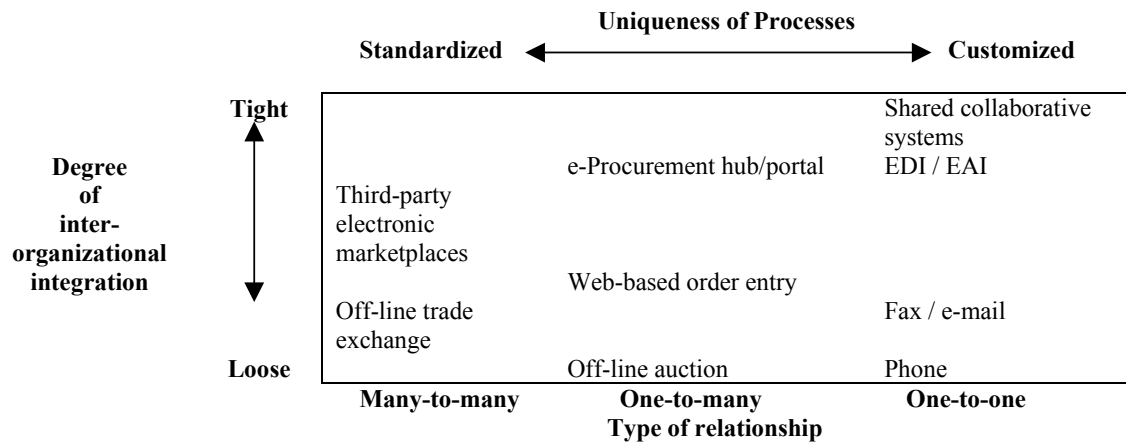
The pilot study to the questionnaire indicated that from a less influential firms perspective were the opportunities foremost continued customer relations, while hinders were several. The most important hinders are scarce resources and dependency of a powerful relation that forces the firm to implement a solution that are in line with the needs of the more powerful firms. The pre-chosen solution is not necessarily the most efficient, but a solution that an important firm in the supply chain already has invested in, and the firm with less ICT-maturity will not gain advantage from the solution. The ICT -problems is enhanced for SME's when several large firms demand adaptation to their specific ICT-systems.

The pilot study further indicated that large firms gain advantage over SME's since the latter have fewer resources to utilise new technology and they are in no position to influence preferred ICT-solution. The realisation of opportunities with ICT depends on the firm's maturity of ICT. SME's decision is more in terms of either to go for the available option chosen, or recommended, by another firm or to keep out of ICT-integration. The "available" option is likely to be an ill-suited solution for small firms' needs that suggest that incompatible ICT-solutions is an upcoming constraint for supply chains to integrate. The organisational size, needs, and incompatible systems will act as self-fulfilling prophecy against integration, due to incompatible supply chains, i.e. firms of different size and needs. The consequence might be that the extended enterprises would develop to consist of either large firms or SMEs.

One of the results from the survey is that the means of communication most commonly used are phones, faxes combined with e-mail rather than ICT-systems. In general the conflicts were low in the relationships both to customers and suppliers whether the firms were large or small.

Results established an interesting lack of significant differences between SMEs' and large firms' use of ICT in the supply chain. There were e.g. non-significant differences between small and large firms integrative propensity when it comes to ICT towards suppliers and customers. Furthermore were small and large firms ICT-relation underdeveloped compared with their internal integration-level within their companies. Companies' overall thought that they used IT to a high degree in their external relations, but when looking at what modes they used it was obvious that it was foremost traditional means of communication that were used. EDI, and different modes of integration of IT was rare.

This has consequences according to figure 1 (McLaren et al, 2002) that categorizes systems for supply chain collaboration.



**Figure 1 Inter-organizational systems for supply chain collaboration Source: McLaren et al, 2002, p. 352**

The quantitative results suggested that while companies expressed that their relationships were integrated by means of IT, their actual usage was foremost by phone, fax, and e-mail. Seen in McLaren *et al* (2002) categorization were actual modes of a one-to-one type of relations, with a loose degree of integration, and customized. The chosen ICT-solutions have implications as cost of ownership and benefits as supply chain cost reduction. Systems that are of type one-to-one with a loose degree of integration have low costs and low benefits. Systems that are of type one-to-one with a tight degree of integration have rather high costs and benefits.

Questions arose from these findings since the respondents perceived themselves to be more integrated than they actually were. It was in this state that complementary findings revealed that companies actually are highly integrated but in a customized way in certain relations that will be explained further in the next section.

### **Complementary results**

The interviewed host companies are all business-to-business firms, except one company that also sells to consumers. Table 1 illustrates what kind of ICT the large firms are familiar with and table 2 what kind of ICT the SMEs are familiar with. These tables show the firms' usage of ICT in relations to suppliers and customers and thereafter will we illustrate the degree of usage in this chapter.

**Table 1 Large firms' use of IT in relations**

ICT integration/ Firm	Supplier relationship				Customer relationship				Internal integration
	Phone fax e-mail	Data-base	EDI	Integrated platform	Phone fax e-mail	Data-base	EDI	Integrated platform	
Allbröd	✓			✓	✓		✓	✓	✓
Stiga	✓			✓	✓		✓		✓
Strålfors	na	na	na	na			✓	✓	
IKEA	✓	✓	✓	✓	na	na	na	na	✓
Kalmar	✓		✓	✓	✓				
Bentone	✓				✓				
Electrolux/ Wascator	✓	✓	✓	✓	✓		✓	✓	na

All of the large firms use phone, fax, and e-mail to a great extent. These means of communication is often seen as traditional and highly manual. In Stiga's case is e-mail automatically sent to suppliers from the internal system, i.e. the receiver handles information manually. Several of the large firms indicate that they use phone, fax, and e-mail especially to smaller suppliers. Kalmar and Bentone use phone, fax, and e-mail as their main mean of communication to suppliers and customers.

IKEA and Electrolux/Wascator illustrate the usage of databases towards suppliers. The database is a web-server that is provided by the large firm to their suppliers, who manually connect to the server and gain access to information vital for transactions. The usage of databases as e.g. product catalogues is not included in these answers.

EDI is used to a large extent in large firms relationships. IKEA uses EDI foremost towards suppliers that are "developed", i.e. have ICT-maturity to exchange information by EDI. Kalmar is in an initiating phase and has started to use EDI towards one supplier. Furthermore it is interesting that Kalmar equalized usage of EDI with using integrated platform towards the supplier. Usage of integrated platforms indicates close cooperation and integration while usage EDI as well can indicate that one part in the relationship still handle transactions manually while the other part handle the same transactions automatically.

Electrolux/Wascator, who have an automatically connection from EDI to their internal IT-system, out of 150 suppliers are 45 connected through EDI, Electrolux/Wascator's supplier's are pushed to connect via EDI. On the other side of Electrolux/Wascator's supply chain, towards their customers, it is only two or three customers that have connected via EDI, and out of these are one a firm with owner relationships to Electrolux/Wascator. These results

suggest that EDI is a means of communication when relationships are characterized by dependency, and foremost a means of communication to decrease transaction costs that the powerful part experience. Allbröd and Stiga use EDI towards big customers, e.g. KF and ICA that is two large competing grocery retailers in Sweden. Both Allbröd and Stiga mentioned KF as a customer that they used EDI with.

Allbröd uses integrated platforms towards their suppliers as well as towards their customers. It is however only towards a few suppliers that Allbröd have integrated platforms towards since this solution demands large investments from the suppliers. Among those suppliers that are integrated with their platforms is vendor-managed inventory (VMI) at Allbröd performed. Allbröd applies VMI towards their big customers, i.e. KF and ICA. This implies that learned usage of technology, i.e. how to work with VMI, is a preferred but not necessary solution towards both customers and suppliers. IKEA use integrated platforms towards their shipping agents and some suppliers that are mature enough. Stiga use integrated platforms towards their shipping agents, big customers, and with other firms within the same company-group, and Electrolux/Wascator use integrated platforms towards their customers and suppliers.

The smaller firms use mainly phone, fax, and e-mail to exchange information with their suppliers and customers (see table 2). Artex have customers within the car industry and is by that pushed to use EDI. They argue however that their foremost gain of EDI is to obtain information of orders to their competitors. Stures Färghall has two large suppliers and several smaller. Communication with the smaller suppliers is done with phone, fax, and e-mail while communication with the big suppliers is foremost performed via integrated platforms through usage of EDI. Stures Färghall has internalized the new working procedures and take advantage of close cooperation with their big suppliers but the IT solutions is one-sided decided by the suppliers.

**Table 2 SMEs' use of IT in relations**

ICT integration/ Firm	Supplier relationship				Customer relationship				Internal integration
	Phone fax e-mail	Data-base	EDI	Integrated platform	Phone fax e-mail	Data-base	EDI	Integrated platform	
Artex	✓				✓		✓		✓
Stures Färghall	✓			✓	✓				✓
Materia	✓				✓				✓
Ljungby Maskin	✓				✓				✓
Keycast	✓		✓		✓				na

Materia's only means of communication towards suppliers and customers is via phone, fax, and e-mail. Materia's relationships are foremost to other firms of similar size. Ljungby Maskin had been offered to use an ICT-solution by a shipping agent but turned it down due to low ICT-maturity. Keycast has developed in quite opposite way. Their main means of communication is phone, fax, and e-mail but demands from a big customer, Volvo, to use EDI have resulted in an expanded use of EDI also between Keycast and their suppliers, which implies, as in the case of large firms, that learned usage of IT is leveraged in other relations.

To sum up these complementary, qualitative findings we suggest that modes of communication demanding customer-specific investments are not widespread among firms no matter size. Several large firms push their suppliers, out of their cost-efficiency focus, to invest in specific IT, which is to adapt to the solution of the more powerful part. However firms being forced into a customer-specific ICT-solution take advantage of the knowledge and use this solution in other relationships. It might not be an optimal solution as long as advantage is won by already learnt knowledge. Driving forces to SME's choice of ICT is therefore larger firms' range of choice. This choice has effects, e.g. in relationships were one part still have to manually perform transactions while the other part deals with the transactions automatically. Larger firms as well as shipping agents have been important initiators in providing knowledge and opportunities to less IT mature firms.

### **Analysis of qualitative results**

We will start to make sense of findings from the interviewed companies use of ICT via typical SCM activities. This lead to relations as appropriate level of analysis, but we will continue to

analyse prerequisites that are of special importance to SMEs. Thereafter will SMEs position in supply chains be elaborated.

Activities to fulfill SCM are characterized with mutuality, cooperativeness and integration as shown in table 3.

**Table 3 SCM Activities Source: Mentzer et al, 2001, p. 8**

Integrated Behavior
Mutually Sharing Information
Mutually Sharing Risks and Rewards
Cooperation
The Same Goal and Same Focus on Serving Customers
Integration of Processes
Partners to Build and Maintain Long-Term Relationships

The *integrated behavior* has to incorporate customers and suppliers to achieve effective SCM. This requires a series of partnerships, i.e. an extension of internal integration to integration outside the company towards customers and suppliers (Stevens, 1989; Cooper, Ellram, Gardner & Hanks, 1997). An aim to achieve integrated behavior is visible in our illustrations of large firms and shipping agents offer to incorporate their suppliers and customers in IT solutions that reveal actual and precise information. However, it is not *mutual sharing of information* rather being incorporated into an existing solution. The company having a low ICT-maturity can hardly take advantage of that solution. One of our empirical illustrations showed that a company turned down initiatives to use the shipping agents ICT-solution since their ICT-maturity was low. Several others showed that SMEs preferred manual, simple systems that fulfilled an adaptation to the counterpart but without any real advantage for the SME. It is therewith more a case of forwarding information when it comes to SMEs participation than of sharing information.

SMEs act as outside facilitators to SCM and are therewith not a part of *mutual sharing of risks and rewards*. When sharing information it is hardly a case of equal gains between the different parties (Dainty et al, 2001; Whipple & Frankel, 2000), especially not for SMEs. Our empirical illustrations point to SME's propensity to adapt to demands but with as much flexibility left as possible, i.e. not to lock themselves in a IT-solution that seems to be constrained to be used in a single relationship. Similar findings, i.e. that the low integration of SMEs in supply chains is an outcome of their co-working with many different customers (Dainty, et al, 2001), have occurred to other researchers.

*Cooperation, common customer focus, and integration of processes* involving ICT concern relationships mainly downstream in the supply chain according to our findings. The closer to the final customer the more prevalent the automatic information sharing with common databases is, regardless size of company. Automatic information sharing seems to be a consequence of proximity to end-consumer and thereby point-of-sales orders. These findings supports Harland (1996) findings that the “Forrester effect” is applicable to hard, logistical features of the supply chain as well as to softer, behavioral aspects. The studied SMEs commitment to take part of SCM-activities seems to be a consequence of their first tier supplier and customer relationship. SMEs are rarely any keen advocators for the whole supply chain’s integration or management. Therefore is SMEs position in supply chains of importance as a strategic variable to SCM. SMEs gains of ICT-integration in the supply chains seems however to be a question that should be studied on a dyadic level of analysis, where influences from relations are of importance. The fact is that our illustrated SME activities cannot be explained as SCM activities (Mentzer et al, 2001), it is more a case of adaptation to a relation.

This supports Harland’s (1998) suggestion to research approach. Harland uses the term supply chain management, in an inter-business perspective of integration, as; management of a dyadic relationship; management of a supply chain; and management of a supply network. On the dyadic level is SCM an outcome of the trend of partnerships. The smaller firms in our empirical illustrations integrate the information flow as an effect of the dyadic relationship, i.e. a process of adaptation (Johansson & Mattsson, 1987). This effort aims towards strengthen a non-equity cooperative relationship into a form of strategic alliance, which is essential especially for SMEs to adapt to (Dainty et al, 2001). Harland (1998) further suggests that vertical integration decrease and network relationships increase, which is strengthened by our findings of stepwise integration to specific relationships instead of supply chain integration (see also Skjoett-Larsen, 1999b). The dyadic relationship where one part is a SME is in other words favored by interaction analysis rather than a network-approach.

We will come back to the dyadic relationship after a discussion about the concept Supply Chain Orientation, hence SCO (Mentzer *et al*, 2001). SCO is defined as:

“the recognition by an organization of the systematic, strategic implications of the tactical activities involved in managing the various flows in a supply chain.”

(Mentzer *et al*, 2001, p. 11)

From this definition it is clear that a company who has SCO cannot gain any advantages until companies connected in a supply chain have a SCO, i.e. a prerequisite to activities and benefits of SCM is interconnectedness to firms that have a SCO. Our empirical illustrations points towards a diverse SCO, where large firms are SCO while SMEs lack antecedent maturity to take advantage and thereby willingness to address a SCO. The steps that SMEs take towards SCO are in collaboration with a powerful or more mature part. Normally these would be large firms or shipping agents according to our empirical illustrations. The consequences of the prevalent, diverse state of SCO, is that SCM is implemented in direct supply chains of e.g. three companies but hardly in the extended supply chain. Any firm related to the supply chain that is without a SCO is a hinder to supply chain integration, which might give rise to a question how prevalent supply chain integration really is (Mentzer *et al*, 2001; Bask & Juga, 2001)?

What hinders supply chain integration then? The effectiveness and efficiency (Pfeffer & Salancik, 1978) of supply chain integration elucidates some hinders. The assumptions are that supply chain integration focus on efficiency, and effectiveness is achieved by common customer focus. There seems however to be a trade-off between firm and supply chain perspectives. Single actors strive for efficiency in the chain to achieve effectiveness towards the end-consumer but they do not take the total supply chains perspective into account, and thereby will the efficiency and effectiveness of the efforts vanish. This is especially prevalent for single firms taking part in several supply chains, where each supply chain has its own logic to achieve efficiency. Their objective of efficiency is obtained from conflicting or not fully complementary demands and their activities are levelled to these demands. The companies' environment is not given realities, they are created through a process of attention and interaction, the constraints to certain paths of action is by means of situational contingencies. It can hereby be argued whether SCM is a purely theoretical phenomenon, with limited practical implications, because of the limited ability to manage a supply chain.

Networks are according to Håkansson and Snehota (1995) not managed they are coped with and demands from a powerful relation might be the main reason to adapt to what is seen as supply chain activities. For SMEs were a close relation is the driving force to implement IT-solutions to facilitate supply chain efficiency, the risks are big while gains are limited to their SCO.

Whether ICT plays a major role for SME's collaboration in supply chains depend among others upon its position as a primary or supplementary member in the supply chain (Lambert et al, 1998). A SME's IT integration, as a primary member, to a supply chain might be essential to the effectiveness and outcome, while the integration to another chain, were the SME are a supplementary member, IT is more a facilitator as increased value for the actual customer (first tier). The structural dimensions of supply chains, i.e. whether the supply chain e.g. is wide with many links to suppliers and customers, strain resources and limit links that can be integrated (Hertz, 2001). Lambert et al (1998) studied supply chains that looked different from each company's perspective, the perceived supply chain structure could though be apprehended as arbitrary. Implications of this are that any integration that is done in a SCO purpose has to make sense from each company's perspective. As to the specific quest here, regarding ICT's role for SME's integration in supply chains is though a matter of links to that supply chain, i.e. close links that have to be integrated or links that is important but not critical. Out of our empirical findings we find that SMEs avoid IT in their relations if it is possible. However, in those cases integration is unavoidable they try to take advantage of the new knowledge and in some cases even try spread it to their other relations. As SMEs resources by nature are restrained they strive to integrate only in specific links and as little as possible. It can though be argued that it is not a lack of SCO among SMEs that keep them on a distance to integration via IT, it is an appreciation of their ability and need to integrate any links. In its prolongation it could even be argued whether SMEs are primary members of a supply chain or if they more often are supplementary members?

### **Conclusion**

Through a review of previous research we have questioned the prescriptive focus of management of supply chains and suggested a network approach, especially for the dyadic level in supply chains.

We have also done a quantitative and a qualitative study that described ICT's role in supply chains. Results revealed that degree of integration is low when it comes to SMEs but it is

more as an effect of demands. Activities are not performed in a specific supply chain management perspective, as activities performed are an adaptation to a relationship not to a supply chain. SMEs are not supply chain oriented, but their activities might be so in collaboration with a large company or shipping agent. SMEs' participation in supply chains is thereby restricted to direct supply chains instead of extended supply chains. Choice of ICT in relations is done in accordance with an efficiency and effectiveness perspective out of SMEs position in the supply chain.

ICT gives SMEs few opportunities and several hinders specifically seen to supply chains. In supply chains ICT is a resource among others that neither is a special opportunity nor a hinder for close cooperation since demands are foremost of low cost, customized ICT-systems and one-to-one solutions.

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