Berit Irene Helgheim
Bjørn Jæger
Naima Saeed

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third party service providers
in Global Supply Chains

Høgskolen i Molde
Vitenskapelig høgskole i logistikk

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Berit Irene Helgheim

Bjørn Jæger

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Berit Irene Helgheim, Bjørn Jæger and Naima Saeed

Molde University College
Specialized University in Logistics
Post Box 2110
No-6402 Molde, Norway

Corresponding author: berit.i.helgheim@himolde.no

Introduction

The evolution of Supply Chain Management (SCM) over the last decades has emerged to be one of the key advancements in corporate adoption to an increasingly global competitive environment. SCM has been described as the management of an inter-dependent chain of partners who works together in order to achieve a better economic output for the chain as whole. The increased global competition is mainly driven by the technology evolution, harmonization of national and international laws and regulations, and the economic forces whereby companies realize the potential for more efficient business operations. This has led to a major trend among companies to relocate parts of their operations to places outside their home countries to take advantage of unique business opportunities. For example, companies have transferred research and development to locations that offer an abundant supply of highly educated scientists and engineers (e.g. Ireland, India), and they have moved manufacturing to places where labor is less expensive (e.g. China, India). This involves specialization and division of labour in a global distributed business environment which must be coordinated and managed. According to Presutti, 2003, 70% of a firm's sales revenues are spent on supply chain-related activities from material purchases to the distribution and service of finished products to the final customer.

The primary focus of SCM is to make operations more efficient through increased corporation and integration between business partners in the chain, while the primary focus of Information System (IS) is how Information Technology (IT) can be used to solve a given problem. The increased focus on SCM and globalization where a number of interdependent business processes takes action is supported by and integrated with IS. Together SCM and IS has both the power to make existing chains more efficient and the transformative power to create new types of chain members or even entirely new types of chains (e-service chains, virtual business chains).

One focus in previous research in SCM is on information flow among the partners. Researchers have emphasized the importance of smooth information flow in order to optimize the material flow throughout the whole chain. Nevertheless, the adaption of such integration of information between partners seems to be rather limited. The existing frameworks in SCM describe the cross functional interaction within a firm and relationships between partners in the network. The literature takes information flow between partners as a prerequisite for

optimal business operations in SC. Less attention has been given to the technical integration between members. This is given as an implicit premise without describing the use of such services and the consequences and opportunity for the chain as such. Simultaneous with the increasing use of information systems in SCs, the availability and accessibility of information on the web have raised. The growt rate of web based market places have increased over the last decades.

In this article we identify how technological intermediaries can be efficient service providers of information flow in order to optimize business processes for the partners in a supply chain. Further we explore how intermediaries may influence on the existing SC framework.

Literature review

The trend in global SCM is that decreasing costs or rising prices are not the primary competitive issues but instead firms are focused on product innovation, higher quality, and faster response times (Presutti, 2003). This has provided a breeding ground for consultants and researchers to investigate and conceptualize different types of SCM models. In this section we describe some of these models and highlight the importance for information within each model.

SCM is defined by Lambert et al., 1998, as :

> *The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.*

The general normative description of SCM is focused on the integration of business process throughout the SC and where the information flow between the partners in the chain is fundamental in order to achieve efficient processes. Each business process involves activities from all core members and managing these business processes requires information from the members. This means there will be high frequency of information exchange between channel members which is essential to successful SCM (Closs et al., 2005).

In the evolution of conceptual models in the SC literature many conceptual models have been developed all of which have information flow as a one of the prerequisite variables in order to have efficient business process. Researchers have emphasized the need for responsiveness in supply chains in order to be competitive (Gunasekaran et al., 2008). The responsiveness refers to that the business environment requires an immediate response to demand in order to be competitive.

In the concepts of flexible SC the ability of reacting quickly to unexpected demand is also explained by both the availability of shared information among chain members, and flexible logistics management programs. According to Closs et al, 2005, these two factors will have a positively impact on performance in terms of process responsiveness, delivery competence and asset productivity. Flexibility is important for businesses with high uncertainty in demand, e.g. fashion industry or in business environments with time based competition. Information of the demand distributed to and from all members in the supply chain is a prerequisite in order to achieve this flexibility. In the same area is also agile supply chain described, where the characteristic for these supply chains are the ability to react rapidly on changes to global markets (Vonderembse et al., 2006). Accurate reaction for agile supply chains also depend upon a continuous flow of information from the market. Further, the concept of lean is used for SCs. The concept of lean started in production with focus on elimination of waste and internal manufacturing efficiency by reducing setup times and having small production quantities. In the evolution of lean production, the focus is on value creation and, hence eliminating processes which does not produce value. This concept has been introduced throughout the supply chain focusing on eliminating non-value steps (Vonderembse et al., 2006). Information is connected to sharing of necessary information among the partners in order to avoid sub-optimization for parts of the supply chain for profit maximization through waste elimination for the supply chain as such. In order to attain profit maximization; information from all members is required for analyzing processes and obtain interrelations. Only then can elimination of waste for the SC be done with high accurateness.

Also researchers have examined technologies applied in SCs in order to see the effect of electronic integration of information in SC. For example Ellinger et al., 1999, shows how automatic replenishment programs (ARP) for inventories effects profitability, making information a prerequisite for efficient ARP's. Hau et al., 2004, describes how the bullwhip effect can interfere with SC. The bullwhip effect explains that distortion of production volume

is due to the fact that manufacturer only has demand information from it's immediate neighbors and this lead to an amplified demand pattern in the SC and consequently poor performance.

Further, vendor –management inventory (VMI) which means the vendor manages the inventory of the distributor. The vendor receives electronic messages with information such as current inventory status and demand from the distributor. VMI is an information based concept which requires a high degree of information exchange to be utilized (Christopher, 2000).

Emerging subjects for SCM are environmental issues and traceability. Chain traceability can be used to trace e.g. products throughout the whole production chain, from supplier to consumers (Bechini et al. ,2008). Tracing products will be required from both customers and governments and could also lead to competitive advantages for SCs that are environmental friendly when environmental factors are introduced. Today's global supply chains need to have appropriate information systems and technology in order to trace products or processes. In one specific part of the industrial sector; the food industry, this has allready become a legal obligation for Europe, Japan and United States (Bechini et al.,2008). With an increasing attention towards environmental friendly products and production techniques one may expect that tracing requirements will be compulsory for other industrial sectors as well.

Information systems implemented in supply chains

We have underlined the importance of having information flow between partners in a SC in order for efficient operation for all members. Most researchers have so far focused on fragments of the SC and not the whole SC.

The first widely investigated topic is use of information systems for optimizing business processes within an organization. Such systems are in general known as Enterprise Resource Planning (ERP) systems. An ERP system supports and automates business processes by integrating the organization's functional areas and sharing the data across the organization. In 1960-1975, operations management researchers and manufactures focused on optimization of production in order to become more efficienct (Majed et al., 2003). This attention was driven by the technological evolution which made it possible for computers to solve more complex

problems in an efficient manner. Over the last decades these systems has been developed into fully integrated systems: enterprise resource planning (ERP) systems which, in addition to production, handles all major business processes including procurement, sales and distribution, financial accounting and controlling, and human resources.

We are witnessing a natural development of information systems to support and automate business-to-business operations between partners in the supply chain in the same manner as ERP systems do within organizations. However, management of processes in a single company compared to management of processes across several companies in a SC lead to a more complex situation requiring special attention regarding:

- Standardization: Companies in a supply chain are more loosely coupled than functional units within a company. Standards are needed for an IS to work in an integrated environment across companies.
- Information security, availability and transparency: What information that is going to be shared? Who owns the information?
- Partnership – how to select and maintain supply chain partners with whom the company is sharing information with.

The second subject which many researchers have investigated is E-procurement. According to a numbers of researchers; adaption of e-procurement applications are depending on the size of the firm, whereas larger firms tend to use e-procurement more that smaller companies (see e.g. Lancioni et al., 2003, Pearcy and Giunipero, 2008, Wang et al., 2004). This may also imply that e-procurement maybe one of the most frequently adapted technology among the SC practitioners. Even though only 1/3 of companies in year 2000 have such integration whereas 61% planned or consider integrating e-procurement (Presutti, 2003). Experiences from the real world have shown that the true problem hindering effective B2B e-commerce is not only the costs, but the requirement for establishing technical and process agreement among disparate and independent organizations, especially when the participants in a single value chain is comprised of myriad number of suppliers and customers[1] The complexness of these value chains can be reviewed from four different standpoints, which are related to physical, standards, technical and geopolitical issues (Longbottom et al.,2005). Thus complexity and costs are considered the leading drivers of the emerging integration service

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[1] The B2B Integration Service Provider – Addressing the Primary B2B Obstacle, available online at http://www.ebizq.net/views/download_raw?metadata_id=5985&what=white_paper

provider [1]. Gartner predicts, "Through 2007, that at least 35 percent of internally managed B2B application integration projects will be at least 35 percent over budget (0.7 probability). Through 2007, the complexity of point-to-point B2B integration will force 20 percent of internally managed projects to switch some traffic back to integration service providers (0.7 probability) (Gartner,2004).

In this paper we will focus on information systems that can be used for a B2B relationship in order to achieve efficient information flow. An IS system can be defined as any systematic arrangement for providing a defined group of people with information for purposeful action (Ulrich, 2001).

We will consider expanding our focus to include automation of business processes, i.e. the business operation and the information system are integrated and inseparable. E.g. in international trade standard operations on customs, taxation and verification of environmental requirements when shipments are crossing borders are often automated.
In the case of a B2B relationship there is a need to have a common understanding and knowledge for the chain members for successful implementation. Nelson and Cooprider, 1996, define shared knowledge as an understanding and appreciation among IS and line managers for the technologies and processes that affect their mutual performance.

The research literature for information systems (IS) is limited when it comes to adaption of mutual systems for B2B relationships throughout the SC, although it seems to vary from different industrial sectors. For example industrial sectors with short life cycles are more dependent on efficient SC than traditionally manufactures. This may imply that for example fashion industry and IT manufacturing companies will tend to adapt their supply chains more easily to integrated information systems.

Intermediaries as service providers: Third party information providers (3PIP)

Intermediaries can be defined as firms that operate between the members in the SC network and involve suppliers as well as customers. In this paper we see the intermediaries' as an

information provider which have technological platform which enable information flows between different types of ISs within each firm and between SC members. An information provider aims to transform and distribute information between SC partners and act as a third party information provider (3PIP) where the SC members outsource information related services requiring special know-how to provide the services. This is similar to what Lynn et al., 1996, defined as superstructure organizations which facilitate and coordinate the flow of information to substructure firms. The technological platform, which is the basis for the transformation can be based on an open technology platform as the Internet, however since commercial platforms should be closed to protect business sensitive information technology with security measures is typically built on top of the Interent (Olleros, 2008). This means that a SC may have a customized platform solution whereas the access is open only for defined members where the 3PIP provider is a virtual company which is the owner of the platform. Each member in a SC is normally viewed from a core (focal) company perspective with suppliers on one side and customers on the other. The core company will be the contractual partner to the 3PIP and define suppliers as well as customer which will enter the platform.

There are two common ways of utilizing a service provider. A company can outsource all its B2B related functionalities to a third-party service provider (complete outsourcing solution), or exploit only some of the managed services offered by the operator and continue managing the other functions in-house (hybrid solution). The service provider may well offer some B2B integration solutions that can be implemented in-house style and provide managed services alongside. The complete outsourcing of B2B related functions has traditionally not been regarded as a feasible solution, especially if the company has several existing connections with key-customers that are operating smoothly and seamlessly as a result of years of development and investments in a certain technique (such as EDIFACT, RosettaNet, papiNet etc.). However, with the recent development of virtualization techniques where machine and vendor specific technology is separated from business applications this has changes. The growth of hosting companies and cloud computing providers is increasing. The possibility to utilize a third-party service provider is particularly convenient when interacting with temporary or non-standardized partners. With this hybrid approach, the enterprise maintains the control over important partner connections and delegates the other partner connections to the service provider's custody. Assuming that the internally managed connections and related systems are also capable of providing automated exchange of information, the hybrid solution

has the similar potential to be an effective transaction platform as in the completely outsourced approach (Longbottom et al., 2005).

3PIP service activities

We have in the previous section defined the main activity for the 3PIP to be managing information flow and to provide technical know-how. The need of information between the members may vary and filtering data to provide only necessary information between the partners is easy from a technological point of view. The fundamental challenges are what information to share with whom and how to trust that the system does exactly what is expected and nothing more (system integrity). Further challenges occur when several intermediaries operate simultaneously. This requires an information system functionality that is still a research and development issue. Even Toyota, which is one of the companies who is directly integrated with their suppliers, only gives information to their suppliers which are absolutely necessary (Liker and Choi, 2004). A differentiation of information gives all members the flexibility to choose and decide type of information. This might facilitate the entrance for companies.

The technical platforms open for a number of ancillary activities which the 3PIP may offer. For example a manufacturing company in a supply chain has an interest in monitoring market conditions on both supplier and customer side. The availability of information and global markets make this monitoring task a relatively labour intense for the manufacturing company. Such systematic monitoring by collecting industrial market information and systemize this information into a readable interface should be one of the service offered.

The attending companies may have various internal technologies. The 3PIP platforms are rather easy to access from a technical point of view. A computer with web access is the only requirements for connecting to the platform. Also the cost involved for the individual partner is relatively low. This gives the core company flexibility to replace suppliers. One of the important parts of the trading process is invoicing and many service providers are offering electronic invoicing services for their enterprises. The benefits derived from only electronic invoicing can be specified as follows. From the supplier's perspective, the benefits come in

the form of; decreased amount of rejected invoices, more invoices paid on time, reduced DSO (days sales outstanding), increased productivity, and improved customer service.

From the buyer's point of view the benefits are; reduced costs (transaction costs, invoice processing costs, labour costs), increased accuracy (no manual re-keying), increased accounts payable productivity (accurate invoices, minimized data entry errors), improved cash management (real-time access to invoices, configurable business rules), and maximized discounts (quick processing and approval of invoices)[2]. Third-party operators can be used to perform invoicing service for the company.

The invoicing services are a safe option for those enterprises that are not quite comfortable with the concept of outsourcing all B2B related functions to a third party service provider. Therefore, the invoicing services are often considered to be the initial B2B outsourcing step and based on those experiences the company will decide if it will proceed adopting other services as well. When considering utilizing managed services for a certain business process, project, or function, it requires the weighing of several factors. After a comprehensive study the company should be able to decide which functions to perform and solution to build internally and which managed services to utilize externally[3].

In addition to the main service, of managing the collaboration and communication among partners, the technological intermediaries can provide additional services, e.g. services to manage and synchronize product catalogues and inventory information. In case, the service provider manages all the B2B related functions on behalf of the company, it has to have an end-to-end view of the whole exchange sequence in order to track and trace the transaction whenever needed. However, an important point to note, about these technological intermediaries, is that their incentives may not coincide perfectly with focal company's incentives. As in most classical principal-agent situations the incentives of the self-interested agents are not likely to be completely in line with the focal company's incentives (Eggers et al.,2000)

Also, a number of the suppliers in SC are non-strategic suppliers. These suppliers provide the company with standardized products. In order to control that these suppliers are delivering

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[2]GXS Invoice Delivery Service. (2007). Available online at
htp://www.gxs.com/pdfs/Data_Sheets/DS_IDS_GXS.pdf
[3]The B2B Integration Service Provider – Addressing the Primary B2B Obstacle, available online at
http://www.ebizq.net/views/download_raw?metadata_id=5985&what=white_paper

according to agreements, manufacturing needs to monitor and control incoming orders. A normal contract between such suppliers and the manufacturer is framework agreement for 1-3 years. The manufacturer buys from these companies based on lowest price. Instead of having the framework agreement, the manufacturer may have a continous bidding competition among non-strategic suppliers. That is, the 3PIP provider automatically sends a request to a defined number of suppliers and the first respondent get the order. This will in principle give the manufacturer the best offer according to the specification of the request and control and monitoring will probably be less.

The figure below illustrates the connection between the firms in a standard SC.
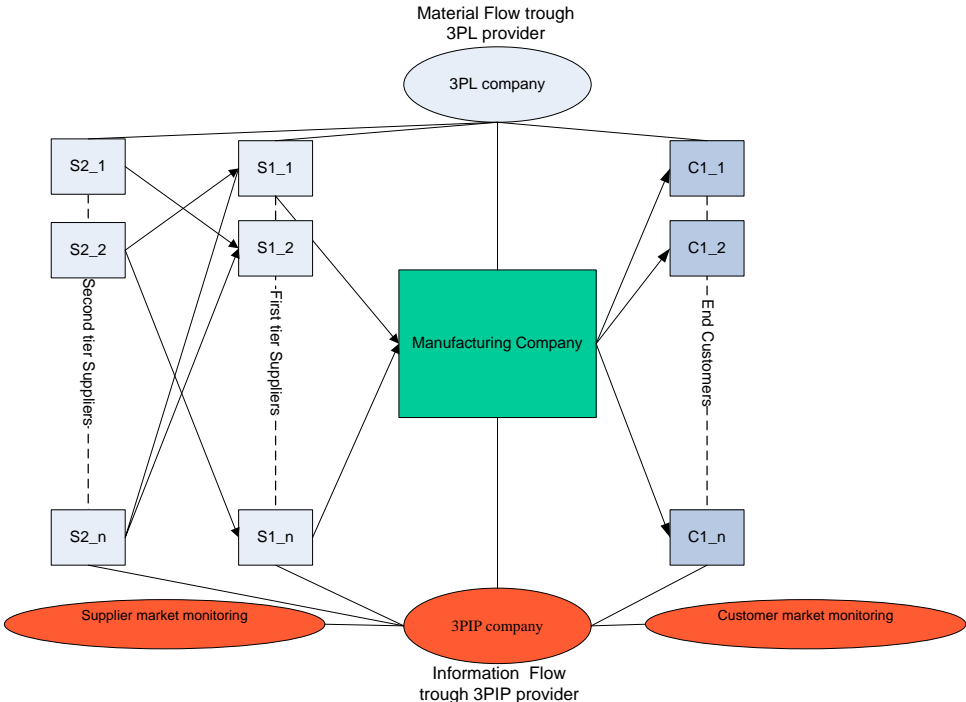
Selection of technological intermediaries

The relationship with an integration service provider will likely be long term; therefore, it is essential to find the best fit for the company's needs. It is a mistake to assume that it will be any easier to swap out an integration service provider then to swap out a software package once a large B2B e-commerce network has been deployed.

In addition to usual factors such as cost-effectiveness, deployment speed, and company background, the following are some other consideration for selection:

Support for Diversity, Autonomy: The support for diversity and autonomy means the service provider's capability to offer various connection methods (direct connections, portals, through client software), mediating between multiple security mechanisms, and solving or arranging differing business processes and interaction methods (store-and-forward vs. real-time, atomic exchange vs. long-running transactions).

Experience and Track Record: Another aspect to examine is the service provider's experience. Since every service provider candidate will probably have several customers and some experience, it is important to explore the customer list to find out service provider's experience in technical areas, industries and processes close to the company. Moreover, the service provider's track record will reveal hints of their customers' satisfaction and loyalty. Asking opinions about the service provider from its existing and former customers may further aid in the decision-making.

Behind the Wizard's Curtain: The final decision is nearly always based on trust, both on a professional level and from technical point of view. The trust will be built during the search process that is comprised of many different aspects, in which the service provider's public image and previous experiences with the company serves as a background. Some of the aspects worth considering are listed here:

- estimating the service provider's ability to offer the promised services in a long term business relationship
- calling for detailed descriptions of the prospective services, and if possible asking for a brief about the operations and technology to ensure the quality of service
- making sure that the infrastructure and processes exists, so that they are not falling behind the marketing
- checking the consistency of the integration platform to find out if it's an integrated entirety or a set of disparate solutions
- considering the security and reliability measures that are offered
- assessing the disaster recovery abilities[4].

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[4] The B2B Integration Service Provider – Addressing the Primary B2B Obstacle, available online at http://www.ebizq.net/views/download_raw?metadata_id=5985&what=white_paper

Factors which may obstruct electronic integration in SC

There may be a number of reasons for why partners in a SC have not adapted IS integration yet. Some are mentioned above. Unlike other researchers in this field, we will explore some factors based on previous inter-organization literature in marketing. It is reasonable to assume that companies are familiar with results from this research since this is a mature research field. They will view integration of IS in relation to their current knowledge.

First, it is well known that companies are in general skeptical against tight integration to suppliers. This is due to relations dependency on one or few suppliers. From transaction cost theory, opportunistic behaviors from such main suppliers are emphasized as one of the main problems; hence suppliers follow their goals and not the common goals for the partners. A technological integration may be seen as amplification of the level of integration.

Second, the risk for opportunistic behaviors increases if there exist specific asset investments such as IT technology between the partners. The rational behind this is that if the investment makes it harder to switch between partners or exit the SC, the risk for opportunistic behaviors increases.

Third, the flexibility to change between SC partners may seem harder. In general companies want to have this flexibility in order to continue to use competition among e.g. suppliers for price negotiation. If switching supplier are attended with costs for the buying company this will imply that companies will be more reserved to do so; hence the supplier may increase the price of the product without any consequences.

Fourth, companies will in general be skeptic to IS which might give others access to strategic information. Even if this can be avoided and the security in such integration is defined by the user itself, companies will avoid taking risks which they may believe is infested with leaking of strategic information.

Final remarks

The complexities of the global supply chains have forced companies to outsource non core activities to third party logistics providers (3PL). These providers are external companies that perform logistics activities which encompass the entire logistic process or selected activities within logistics (Lieb, 1992).After the evolution of supply chains and the globalization of

business transactions, there has been an increasing use of outsourcing services to 3PL providers the last decades (Lieb, 1992, Lieb and Bentz, 2005). The 3PL companies offer a range of service from standardized inventory and distribution services to more customized services ;e.g. packaging, labeling and assembling (Bask., 2001).

Similar to the evolution of outsourcing 3PL activities, it is likely that SC network will outsource information flow and activities to 3PIP companies. The complexities of information flow are increasing; a structured information flow of necessary information is prerequisite for operating in a SC.

Nevertheless, the outsourcing strategy is not well implemented or used in SC network today. One factor may be the lack of knowledge for what kind of activities or services these providers may offer and the knowledge according to risk assessment by technological integration. Another may be that 3PIP providers have not seen the business opportunity and commercialized the opportunity for such business arrangement and do not have proactive approach for marketing the service activities.

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