NEW COLLABORATIVE BUSINESS MODELS FOR SUPPLY PARTNERSHIPS: TAKING ADVANTAGE OF SHARED PRODUCT AND PROCESS INFORMATION

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Abstract

This is the first of the series of papers from the research project called ARIEL. Importance of sharing sensitive information, especially costing information in supply chain is discussed. Concerns related to the current state of information systems as information sharing enablers in inter-organisational relationships is pointed out. Paper further introduces the methodological approach which increases understanding and transparency of supply chain processes, related costs and time in dyadic customer – supplier relationship. Study seeks to extend Supply Chain Time and Cost Mapping (SCTCM) method to customer - supplier dyad. Collected data will be used the inputs to develop an innovative model that will be developed into a tool to evaluate different ways of configuring customer – supplier processes. In addition to this challenges related to the selection of case studies and process modelling are pointed out.

Key words: Supply Chain Management, Information sharing, Cost visibility, Business process modelling

Introduction

There is growing concern in supply chain community about the difficulties that organisations experience in their attempts of searching opportunities for waste reductions beyond the organisational borders. Information hoarding, adversarial mindsets, slow migration from functional to process integration keep companies in their functional silo and arms length relationships with their suppliers. The internal focus of the current supplier improvement approach misses out on opportunities to improve the interface between customers and suppliers, and also the possibilities of exploiting business opportunities by utilising joint capabilities of the customers and suppliers. The inability by organisations to understand costs, processes and potential opportunities for operational improvement in dyadic relationships leads to suboptimal decisions, which have a negative impact on the effectiveness of their supply chains. In the area of information sharing in supply chains concerns raised due to the absence of empirical work are not unusual (Lee and Whang, 2000; Dekker, 2003). To the certain extend, this absence is quite surprising, based on the numerous highlights of the importance of information sharing in supply chains for "development of long - standing deep alliances" (Tomkins, 2001), cost reduction by eliminating non value added activities from business processes (Barratt, 2004), "improved resource coordination" (Radhakrishnan and Srinidhi, 2005) and for "entire area of continuous improvement" (Ellram and Hendrick, 1995) in supply chains. In order to propose an approach how to take the advantage of timely and accurate availability of information from each partner's IT systems in dyadic relationship, a research project ARIEL has been designed between Supply Chain Research Centre and School of Applied Sciences at Cranfield University. The main idea behind the ARIEL project is to assess time and costs in supply chains in dyadic relationship. We seek to extend SCTCM method (Mena et al, (2004) which was initially developed in intra organisational context to customer - supplier dyad. Data collected through the application of this methodology will provide the inputs for developing of innovative modelling method for evaluation of different ways of configuring customer – supplier supply chain processes. Following that, the main objectives of ARIEL project are:

- To extend and assess the suitability of SCTCM method (Mena et al, (2004) in customer-supplier dyad.
- To create an innovative business process modelling method that will be developed into a tool to evaluate different ways of configuring customer-supplier business processes.
- To assess the minimum changes in dyadic relationship needed to improve co-ordination in supply partnerships.

Literature Review

Information sharing is recognised as a crucial part of supply chain initiatives, such as transition from adversarial to collaborative relationships, shift from forecast to demand driven supply chains, supply chain process costs tracking, supply chain process integration, shift from managerial accounting to value based management, etc. (Bowersox et al, 2000, Christopher, 2005). Tomkins (2001) is arguing that "development of long – standing deep alliances implies sharing information, and working out collaborative futures, showing how the risk/return position of each is affected by different actions". Barratt, (2004) stresses the importance of information sharing and transparency and quality of information flows for development of many accounts of supply chain. He argues further that particular problem to greater transparency in supply chain is intermediation, because "it creates the asymmetry and impactness of information". And secondly this intermediation "increases costs and frequently constitutes a non value adding activity". Myhr and Spekman (2005) conclude in their survey based research on the sample of 157 industrial relationships that "by constant interaction and information sharing via electronically mediated exchange, partners experience a closer bond and this serves to re-enforce trust that contributes to collaboration". Radhakrishnan and Srinidhi (2005) report that "value of information exchange is derived from improved resource coordination". In spite of recognised benefits of information sharing, concern about almost a total absence of empirical work on information sharing in supply chains is expressed by several authors (Lee and Whang, 2000; Dekker, 2003). Kemppainen and Vepsalainen (2003) argues that cost transparency is particularly important area of information sharing between partners in supply chain in order to reduce total supply chain costs. Based on their research findings "cost transparency has changed and even bigger changes are expected". Importance of management accounting in terms of providing decision making information and knowledge to managers on strategic and operational level is unarguably recognised (Kulmala et al, 2000; Axelsson, 2002). Sharing costing information in supply chains is a particularly topical, area, especially because of the recognised shortcomings of current accounting practices, which are too limited to provide a good decision making basis from inter and intra organisational perspective. In the supply chain context, standard cost accounting methods tend to be inappropriate to address wide scope of integrative and process oriented nature (Bechtel and Jayaram, 1997) of supply chain management for reasons such as:

- Information captured using standard costing are insufficient for determining costs related to supply chain processes (Cokins, 2001)
- Standard costing as a cost assessment tool for identifying inter – organisational cost reduction opportunities is not suitable for its limited scope (functional instead of process oriented) (Christopher 2005; Cooper and Slagmulder, 1998; Mena et al 2004)
- Standard costing does not encourage improvements (Gupta and Gunasekaran, 2004)

The basic premise behind ARIEL project is that by improving the visibility of how costs and time are generated in the dyadic relationships the opportunities for a closer collaborative relationship could be recognized. Our proposed approach aims to take advantage of timely and accurate availability of information from each partner's IT systems, enriched with additional supportive information. Organizations, or even departments within an organization, have two types of information: public and private (Premkumar 2000). These two types of information support execution of processes. While the public information is provided by the organizations' IT systems the private information is owned by the individuals or groups of individuals. Also, organisations' IT systems collect vast amounts of information, but most of the information collected is never used again. In the mid- to late 1990s, many large corporations undertook one of the most ambitious IT systems projects in their histories: the implementation of Enterprise Resource Planning (ERP) systems (Davenport et al, 2004). Nah (2002) defines ERP as: a method for the effective planning and controlling of all the resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service company. The "company wide" perspective becomes the major drawback of these systems in a light of the supply partnerships. These systems were not designed to be a media through which the company's suppliers and partners share information with the aim of enhanced end customer value. According to Delphi study (Akkermans et al, 2003) conducted among 23 Dutch supply chain executives of European multi-nationals, limitations of current ERP systems in providing effective supply chain support are following:

- Insufficient extended enterprise functionality in crossing organizational boundaries;
- Inflexibility to ever-changing supply chain needs;

- Lack of functionality beyond managing transactions; and
- Closed and non-modular system architecture.

These limitations together with others such as lack of analytical and decision support abilities (Tarn *et al*, 2002), have brought to development of IT systems which are claiming to support the extended enterprise paradigm. The term extended enterprise is expressive of this evolution in ERP systems from having a primarily internal focus to a new era in which, by means of Internet technology, systems reach out to suppliers, customers, and a wider range of employees (Michel, 2001). This idea is similar to the idea of Möller (2005), who divides the perspective of supply chains on the upstream and the downstream supply chain management. Similar perspective to that of Möller (2005) is found in Chopra and Meindl (2003) and Weston (2003). According to these authors the proliferation of IT systems resulted in three groups of systems that are supported by the legacy ERP system. These are Customer Relationship Management (CRM), Supply Chain Management (SCM) and Supplier Relationship Management (SRM) systems. The problem of these systems is that they still do not provide an integrated supply chain IT system solution and according to Davenport and Brooks (2004) we are at least a decade away from such a solution.

Methodological approach

For the purposes of this research three case studies are selected. Three case studies are selected from the manufacturing industry in the following sectors: food (low variety - high volume), automotive (middle variety - middle volume) and aerospace (high variety – low volume). Eisenhardt (1989) points out a need for specific selection of case studies (not randomly selected) in order for researchers to control environmental variations. With the selection of the multiple case study strategy we are addressing one of the most widely criticized issues in the case study research – external validity (generalisability) (Yin, 1994; Ellram, 1996; Eisenhardt, 1989). Ellram (1996) suggests addressing the issue of external validity during the design of the research. The issue of external validity is best addressed by replicating case studies and verifying patterns (Ellram, 1996). In the design of our research we will follow Yin's (1994) replication approach for multiple-case studies. Yin (1994) is pointing out that replication logic applied to case study is not the same as the sampling logic used in surveys, where "a number of respondents are assumed to "represent" a larger pool of respondents or subjects". Consequently data collected from the sampling pool are assumed to represent data that might be collected from the entire pool. Following the replication – analytical generalisation, "each individual case is a "whole" study"…"each case's conclusions are then considered to be the information needing replication by other individual cases" (Yin, 1994). The unit of analysis of this research is dyadic relationship. Therefore each case under the study consists from two organisations, customer and tier one supplier. Dyadic relationship is characterised by the value stream of selected product between customer and tier one supplier. Careful instead of random selection is also strategy for selecting supplier in a dyad. Following criteria for supplier selection are formulated:

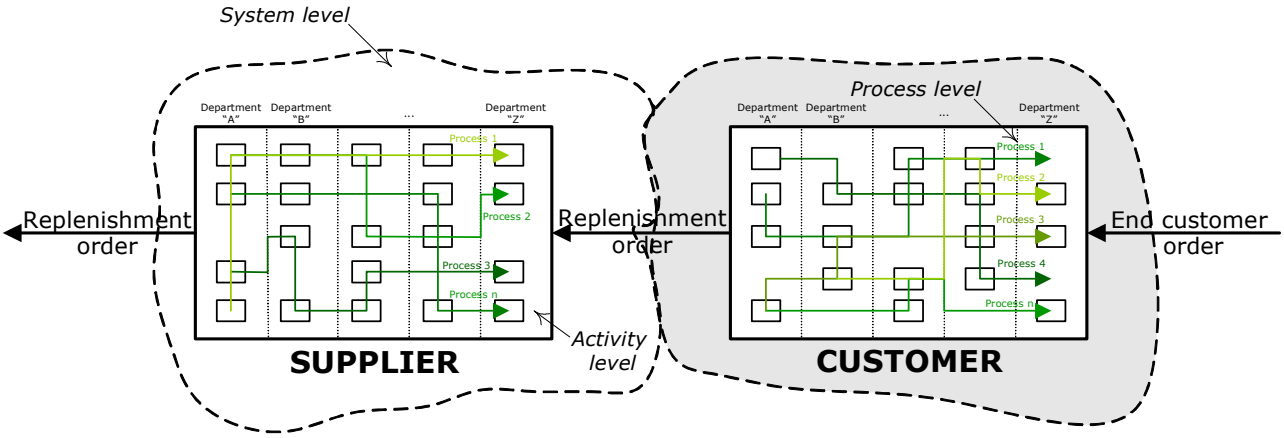
- Supplier has to agree to participate in research on voluntarily basis. Participation should not be mandated.
- Relationship with customer should involve certain degree of mutual trust. Lamming (1993); Cooper and Slagmulder (1998), Ellram and Hendrick (1995) stress that companies where certain degree of mutual trust exist are willing to share sensitive information much more likely than organisations where trust is not present in the relationship).
- Supplier's survival on the market should not be dependent from the business with the customer, although, a business should have a strategic importance for both partners. In the selected dyad none of the involved organisations should exert power against another organisation. Big imbalance of power in the dyad will more likely reflect in mandated inter-organisational relationships. Mandated inter-organisational relationships are based on Hall (1977) "more intense, imbalanced in favour of one organisation, and less cooperative".
- Selected product has to satisfy following criteria:
    - Availability and accessibility for information
    - High frequency, high volume and demand for product
    - Stable demand (mature product)
    - Company's choice of product

Each individual case study will be approached as described in the following steps:

Step 1 - Project Definition: Project team on customer's and supplier's side is defined. On the both sides of dyad project champion has to be selected. At this stage we also agree on the project scope and objectives and define the timeframe of the project. Project champions from the both parties will provide information about the system level description (Figure 1).

Step 2 - Process Mapping: In this step we will map the selected supply chain processes (material and information flows) as a result of conducting interviews on the process and activity levels (Figure 1). For the process mapping following mapping techniques will be used: IDEF0 and IDEF3.

Figure 1: Project's scope and level of detail



Step 3 - Cost Collection: Interviewing customer's and supplier's accounting and purchasing personnel on both sides to collect financial and non-financial data to enable accurate costing of activities that form the supply chain process for the selected product under investigation.

Step 4 - Time Based Analysis: Analyse the inter-connecting processes that constitute the supply chain in relation to time using time based process mapping. This tool identifies areas of waste by classifying non-value and value adding processes.

Step 5 - Translation Matrix: Data collected in stage 4 is translated into the supply chain processes identified in stage 2. Indirect costs are allocated using cost drivers in a similar way to activity based costing (ABC). However, our method is much simpler than ABC because we focus on a single product rather than on a range.

Step 6 - Cost time Analysis: Displays the accumulation of supply chain costs over time as a graph.

Step 7 - Cause Effect Matrix: The cause-effect matrix analyses relationships between processes to show the origin of waste and its effect.

Step 8 - Process Model Design: Based on the information collected in the steps two and three the research team will build a model which will be an abstract representation of business processes in the dyad under the observation.

Step 9 - Process Model Validation: Customer and supplier are invited to validate the model built in the step eight in order to ensure realistic representation of actual processes in the dyad.

Step 10 - Scenario Evaluation: Business process model designed in the step eight and validated in the step nine will enable us to play different relationship scenarios and different configurations of business processes in the dyadic relationship. This will help us to define opportunities for improvements for instance by focusing on taking time and cost out of the supply chain processes from better material and information flow coupling in dyadic relationship. We are also aiming to identify what minimum changes are required in order to improve co-ordination in dyadic relationship.

Step 11 - Case Study Analysis/Report: As mentioned earlier, each individual case study is a "whole" study. Therefore conclusions and reports have to be written for each case study, as they are seen to be the input information needed for the replication of other individual cases. The report should indicate how and why a particular hypothesis was (or not) demonstrated (Yin, 1994). There are some challenges and risks involved with this approach. Although we are suggesting criteria which should be considered for the selection of a dyad, customer will

have the decision making power for the selection of tier one supplier. This selection will firstly satisfy organisation's business needs and secondly our criteria. Potentially low level of trust in such relationship and unwillingness to share sensitive information can be a hindrance for data collection and case study execution. As Dekker (2003) points out in his analysis of inter-firm relationships, appropriation concerns and opportunistic behaviour when sensitive information is disclosed in inter-organisational relationships should not be ignored. We should expect that organisations in dyad might be reluctant to share sensitive information with each other, especially if there is a lack of trust among them. Therefore selection of a dyad by following our criteria could help mitigate this risk. Furthermore, the modelling tool that is going to be used in the model design stage (Step 8) is a database business modelling tool (Enterprise Modeller). Business models are being deployed by using predefined objects (e.g. Processes, Activities, Functions, Flows, Resources, etc.) and developing custom made objects. The real-world complexities can be modelled by using the inter-object relationship modelling capability of the software. Innovative business process modelling method is based on the timely and accurate availability of information (public and private), and the material and information flow coupling concept. The material and information flow coupling concept is based on the identification of objects that are constraining or enabling the information flow needed for the continuous material flow. These constraints or enablers could be identified by providing the answers on the following questions:

- What data/information is important for continuous material flow?
- When this data/information should be released to the one who needs it?
- Who is the one who should release the data/information and to whom should it be released?

Two challenges stem as the result of such thinking. First is related to the identification of the objects that are constraining or enabling material flow and the second to the objects' inter-relationships. Using the software's vocabulary first one deals with the development of the custom made objects while the second one is related to the more subtle issues of modelling relationships between the model's objects.

Conclusion

In this paper the research methodology that is going to be used in ARIEL project is presented. Project aims to take advantage of timely and accurate availability of information from each partner's IT system, enriched with additional supportive information. Three in depth case studies are going to be used. As the outcomes of the project we are expecting following:

- To increase the understanding of supply chain cost, time and process related information sharing in dyadic relationships.
- To build a model that can be used as a tool for configuring, evaluating and decision support of different processes in a dyadic relationship.
- To asses the minimum changes needed to improve the co-ordination in a dyadic relationship.
- To identify the issues which need to be taken into the account during the business process modelling or business process improvement initiatives of a dyadic relationship.

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