E – Supply chain Management

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Abstract: E-Supply chain management in a manufacturing context is a series of Internet enabled value-adding activities to guarantee products created by a manufacturing process can eventually meet customer requirements and realize returns on investment. Supply chains have advanced in the last two decades with improved efficiency, agility and accuracy. The recent advancement of Internet technology has brought more powerful support to improving supply chain performance. In this context, e-supply chain management becomes a new term that distinguishes itself by net centric and real-time features from traditional supply chain management. In this chapter, principles and methodologies of e-supply chain management are discussed. It focuses on a fundamental challenge for supply chain management: how to efficiently integrate and optimize supply chain operations with widespread marketplaces and characteristic demands using the latest advances in information and communication technologies. A case of e-supply chain management application is also described in this chapter. As Internet and related technologies have been discussed in detail in other chapters of this book, this chapter will focus on e-supply chain management principles, approaches and methodology.

Keywords – e-supply chain management, Internet, strategic possibilities, competitive advantage, information systems and technologies.

1. Introduction

Supply chain is a series of business processes in which products or services are produced and delivered to customers through value adding activities implemented by involved parties. In a manufacturing supply chain, the value adding activities mainly include product development, product design, raw materials supply, manufacturing the product, product packaging, delivery to customers, and post sale services. Supply chain management for a manufacturing company refers to incorporating its manufacturing process to all value-adding activities implemented by parties who add values to its final products. The term, supply chain, is a simplified description for vertically related business processes. Nowadays, it is more frequently referred as supply networks or supply chain networks because a company is likely to be involved in more than one supply chain and the related companies form business networks. Since information technology became an enabler of improving business processes, supply chain management has gained tremendous benefits from applying ICT to various aspects of its tasks. IT application moves from data management to control automation, and then moves to enterprise integration. Supply chains have advanced the last two decades with improved efficiency, agility and accuracy. However, it was only at the time when the Internet technology became a practical means of information exchange in industries, that supply chain management started changing its way of allocating and controlling resources across organization boundaries. When business activities of a company are electronically incorporated in value-adding processes throughout the supply chain, e-supply chain management becomes a new term that distinguishes itself by Internet-supported, net-centric and real-time features from traditional supply chain management. In this chapter, principles, methodologies and examples of e-supply chain management will be discussed in the following sections.
2. Principles of e-supply chain management

The fundamental challenge for supply chain management is how to efficiently integrate and optimize supply chain operations with dispersed marketplaces and characteristic demands using the latest advances in information technology. E-Business using Internet technology to facilitate information exchange and communication in business networks has emerged as an innovative approach further exploring value-adding opportunities in supply chains. The e-business approach plans and executes front-end and back-end operations in supply chains using Web-based applications. Incorporating e-business approach in supply chain management has proved as a competitive method for increasing values to be added and improving process visibility, agility, speed, efficiency, and customer satisfaction’s. Supply chain refers to the business activities that incorporate e-business approaches into supply chain processes. E-Supply chain management involves applying e-business technologies to assist and optimize value-adding activities in supply chains. A more detailed definition of e-supply chain management can be found in the description of Norris.

Adding values to e-supply chains

Manufacturing supply chain management should focus on maximizing values added to products to be delivered to customers. The value-adding activities form a value chain which connects a company’s supply side with its demand side to transform concepts and materials to final products. Traditionally, values are mainly added by primary supply chain functions, such as inbound logistics, production, outbound logistics, sales and post sale services. Information systems, finance, and human resource management are supporting activities which are input and infrastructure of the primary activities. Incorporated with the e-business approach, supply chains have now been enhanced with more efficient value-adding capabilities and new business models, e.g., more agile manufacturing processes due to visible real-time demands of end customers and virtual integration of manufacturing with retail store controls, etc. The information systems are therefore key activities for adding value to e-supply chains. Figure 2 describes the value-adding activities of an e-supply chain. In networked e-supply chains, information flows are integrated by ICT, particularly the Internet technology. Supply chain members are directly connected with customer demands and real-time operational information of all supply chain stages. This leads to synchronized supply chain Planning and coordination, with more efficient physical product flows.

E-Supply chain integration

Supply chain integration ensures a supply chain operating seamlessly as an extended enterprise. The integrated supply chain will facilitate agility, shorten leadtime, and reduce operation costs. The integration implies that supply chain operations (e.g., product development, materials supply, product manufacturing, assembly, packaging, delivery, stock control, and customer support, etc.) are synchronized with virtual enterprise planning which aims at integration and coordination of the supply chain operations. It is obvious that supply chain integration focuses on information system integration instead of organizational integration. It is Internet-enabled technologies that make supply chain integration practically feasible and efficient. An e-supply chain is actually an Integrated virtual enterprise. E-Supply chain integration ensures that supply chain legacy systems and operational systems are seamlessly incorporated into networked business environment connected through the Internet and other information and communication facilities. E-Supply chain integration is at different levels with different focuses.

E-Supply chain co-operation
Co-operation is a strategic term in supply chain management. It is an important factor for supply chain success. Research from various perspectives has been conducted to explore the impacts of co-operation and opportunism on supply chain partnership success. Key factors which positively affect partnership outcomes have been found, such as interdependent organizational structure, cooperative attitude, normative contracting format and behavior transparency, etc.

Properties of e-supply chain virtuality

The most relevant properties of virtuality to supply chains are virtual environment, virtual aggregation, and virtual organization

Virtual environment

Internet has been applied to developing various applications to support e-supply chain management. The applications provide a virtual environment for partners and customers to exchange information and complete transactions. The virtual environment can be created at any supply chain stage. For instance, a retailer’s e-marketplace provides a virtual environment for consumers to access to product catalogues, ordering preferred products and completing transactions. Tesco Supermarket on-line is a Web portal through which customers can order commodities in a catalogue and complete transactions on-line. The portal also provides financial services for customers and allows customers to customize the Website according to their preference. Such a Web portal is a seller-side e-marketplace which is a virtual environment for downstream supply chains to directly connect retailers with end customers.

Web-based applications can be developed as a virtual environment for manufacturing control. It can be used to monitor and control a manufacturing process and provide product design services, etc. Wiptrac.com is a Web based manufacturing control system. It monitors shop floor manufacturing processes and control product qualities. Engineers can review process and quality control charts in real time. According to the on-line information, manufacturing process can be remotely monitored. Alarms demonstrated by the system can be responded to in real-time. Processes can be shut down when they are out of control. For an enterprise with distributed manufacturing sites, a virtual environment of manufacturing control works as a virtual control centre to synchronize the distributed manufacturing processes.

One Space Collaboration is another example of virtual environment that allows engineers to work interactively in a team. It supports collaboratively loading, viewing, inspecting and modifying product design models and drawings. The system virtually integrates distributed design teams to view and share documents and drawings, mark up data, capture issues and ideas by marking up models and documents, make and document decisions, schedule meetings and automatically generate email invitations to participants. The application works as a virtual department of product design connecting supply chain partners to sharing knowledge.

Virtual aggregation and integration:

When all of the supply chain functions are integrated by various e-business applications, the whole supply chain virtually operates as a vertically integrated enterprise. The distributed operational processes in different companies can be aggregated and synchronized based on end customer requirements. Workflows or business processes (BP) are controlled by Web-based systems which make the whole process visible to all involved partners. The workflow can be automated to some extent through multiple agent systems without or with limited human interactions.
Virtual organization:

Virtuality in the virtual enterprise context emphasizes virtual organizational structures. A supply chain can be formed based on particular customer requirements and may be reconstructed later according to different requirements. The advantages of dynamic structures of virtual enterprises are the best combination of core competence of participants, flexible value-adding capabilities, and agile processes to serve demand changes. Internet technology makes it possible that e-supply chains can be formed dynamically, for instance, a brand product manufacturer outsourcing components in manufacturing, assembly, packaging and delivery services. It remotely controls and integrates the distributed processes as a virtual enterprise.

Figure 1 Virtual enterprise formation (Source: [10]).

3. Functions of virtual enterprise

Functions of a virtual enterprise can be summarized as customer interaction, asset configuration, knowledge leverage and virtual process co-ordination.

Virtual customer interaction:

This function concerns customer service activities including information publishing, virtual marketing (on-line advertising, on-line-retail, on-line distribution, on-line payment), customer relationship management (service customization, interactive communication), community marketing (forms a many-to-many communication environment as a virtual community). Implementation of virtual customer interaction is the most common business-to-customer e-business application. Examples of such applications can be found at Amazon.com, Dell.com, Safeway.com, etc.

Virtual asset configuration:

This function concerns virtual enterprise formation based on a business opportunity. Through Internet-based applications, potential partners can be found, consulted, negotiated, and contracted. The enterprise asset should be dynamically configured based on customer requirements. Asset configuration is also referred to virtual sourcing.
Virtual knowledge management:

With e-business applications, knowledge can be more easily shared through intranet, extranet and other information systems. Experts or knowledge of specified domains can be accessed through the Internet when it is necessary. This is very important to supply chain Co-operation as the barriers in distance and time prevent partners’ collaboration in complex engineering and operational issues. Transferring knowledge on-line makes it possible for partners to solve problems and conflicts responsively. As a virtual enterprise approach for cutting stock applications proposed by Gary complex models and tools for optimizing the material’s size, product designs and then cutting plans are developed into a Web-based system which is assessable on the extranet by partners. Suppliers, manufacturers and customers can be linked by the system which functions as a broker. The system is particularly valuable for SMEs which do not have the capability to develop or purchase such complex tools. The manufacturers who need to optimally cut the materials for product processing can consult the system interactively for cutting plans based on given materials. In this process, suppliers and customers are also likely to be involved by co-operating in the optimal overall solution for the material’s size, product specifications and cutting plans. The partners work together to share the knowledge of operations optimization.

Virtual process co-ordination:

The dynamically organized workflows should be planned, executed, controlled and monitored co-coordinately. Dominant enterprise may play the role of a co-coordinator in a VE operation. The co-ordination is more centralized in such a situation, e.g. the automobile manufacturing companies and their suppliers. In a VE with members of equal power, rules of co-ordination need to be negotiated and agreed in a more democratic manner, e.g. networks consisting of small retailing companies, packaging companies and commodity manufacturers.

Infrastructure of information systems for e-supply chain management

An e-supply chain system is networked information systems which serve different value-adding activities for different supply chain partners. Typical information systems in e-supply chains include:

- Communication systems (CS)
- Transaction processing systems (TPS)
- Management information systems (MIS)
- Executive information systems (EIS)
- Decision support systems (DSS)
- Enterprise systems (EPS)

4. Conclusion:

The main subject of this paper was the benefits of adopting e-SCM practices in terms that it contributes to creating a competitive advantage. After defining and giving insight into the e-SCM we have discussed the status of the organizations that have implemented e-SCM and are working by this concept. Improved communication among partners, information sharing and synchronization, cost reduction, smooth production flows, shorter cycle times, reduced resources, over passing barriers of time and space leading to an improved customer satisfaction are all among the benefits of adopting e-SCM. Both real world’s examples as well as second hand research data were used to prove the paper’s
goal that the adoption of e-SCM practices provides numerous benefits enabling organizations to work effectively and efficiently and thus build competitive advantage. The positive benefits of integrating the Internet into supply chain management outweighs the risks and associated costs as innovation and technology incorporation into how business is conducted has become essential and indispensable nowadays. Supporting the paper’s goal is the analysis from the organizations that have adopted e-SCM and the benefits they have enjoyed. The future research related to this topic might include the future improvements as the technology advances, the opportunities of intelligent agents and systems, the advancements in mobile technology. Having this in mind this paper hopes to unlock frontiers for additional researchers in e-SCM areas in order further development and utilization of this concept.

5. Reference:


