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Role of Information Technology and Inventory Management Tools in Supply Chain Management

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Abstract – In today's market, supply chain management is an integral part of any industry. Supply chain management is end to end process in all industries. It is a flow of materials, information and resources from supplier to manufacturer to wholesaler to retailer. Major problems in industry are mostly faced due to poor supply chain management. Reasons of these problems are mainly because of insufficient information, uncertainty in and supply, etc. To avoid all these problems proper supply chain management is necessary. Information Technology facilitates smooth functioning of supply chain. The appropriate flow of information is must to run any supply chain. Smooth IT processes reduces the lead time. In this paper different information technology tools are explained such as Enterprise Resource Planning (ERP), Web services, Bar code, RFID, EID, etc.

In supply chain management JIT inventory management is also an important tool. In JIT inventory management technique, an item will be ordered only if it is needed for shipping or manufacturing. Inventory is stock of physical goods which adds cost to working capital and current assets. Building inventory is necessary to provide good services to the customers. For right balance of stock in warehouse, inventory management is important. Understanding of customer demand is important for proper Inventory control. Inventory management techniques are discussed below such as ABC analysis, FSN analysis and EOQ. To manage forward and reverse flows in supply chain, firms have to deal with upstream supplier exchanges and downstream customer demands.

Key words: RFID, EID, Web services, Information technology, FSN analysis, ABC analysis, Economic order Quantity

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INTRODUCTION

The best companies in the world are finding a powerful new source of competitive advantage. It's called supply-chain management and it encloses all those integrated activities which bring product to market and achieves customer's satisfaction. The Supply Chain Management combines topics from manufacturing, purchasing, transportation to physical distribution into one integrated program. Successful supply chain management coordinates and combines all these activities into a smooth and continuous process. It embraces and links all the partners in the chain. In addition to the departments within the organization, external partners include vendors, information system providers, third party companies, and carriers.

The supply chain refers to a wide range of functional areas which include SCM related activities such as inbound and outbound transportation, warehousing, and inventory management. Sourcing, procurement, and supply management fall under the supply-chain. Forecasting, production planning and scheduling, order processing and customer service are also part of the process.

One of the best definitions of supply-chain management offered till date comes from Bernard J. (Bud) LaLonde, professor emeritus of Supply Chain Management at Ohio State University. LaLonde defines supply-chain management as "The delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing to consumption".

Supply Chain Management includes services such as:

- Operational Analysis and Design Materials Handling
- Distribution Strategy
- Computer Systems
- Operational Commissioning
- Operational Improvements, Distribution Management
- Technical seminars
- Warehouse Design, Project Management
- Computer Simulation

The major problems commonly faced by manufacturing firms were:

- Inaccuracy and inconsistency of information breed inefficiency between SC entities;
- Supply disruption risk acts as a logistical impediment;
- Regulatory compliance stagnates the dynamism of the SC.
- Uncertainty in supply and demand jeopardizes the decision making capabilities of manufacturing firms.

Several solutions are given on these problems. Supplier disruption risk can be remedied by utilizing various suppliers and global outsourcing. Secondly, information integrity can be enhanced by standardization and embracement of new technology. Furthermore, planning of supply and demand can be improved by organizational leadership, SC, value re-engineering and multi-enterprise collaboration. Regulatory compliance can be addressed by establishing a total risk management culture for total quality management.

SC disruption possesses technical or behavioral problems for manufacturers. These technical problems include equipment malfunctions, system failures, and financial distress; while labor strike and human fraud are behavioral problems. Addition to it, disruption may occur from other uncontrollable events such as natural disasters and terrorism.

SUPPLY CHAIN MANAGEMENT TOOLS IN IT

A. Electronic Data Interchange (EDI)

Electronic Data Interchange technology is used by supply chain partners for transactions and exchange of information for the effective running of their business. EDI provides timely information about the customer's sales which is highly accurate and very efficient. It has many uses such as bills of lading, sending invoices and dispatch confirmation. Main benefit of EDI is to enter only informative needs on the computer system once and then it enables the speed of transaction and reduces cost as well as error rates. Some other benefits are quick process, good customer service, paperless technology and high productivity.

B. Bar coding and Scanner

Bar codes are representation of codes in machine compatible language. Bar codes are used to track goods at all levels of supply chain process. Bar codes can be in horizontal or in vertical orientation, named as ladder and picket fence orientation respectively. Bar code specifies name of product and its manufacturer.

C. Enterprise Resource Planning (ERP)

These are integrated systems used for automating all functions of business. Several transactions are used to run this system. SAP is one of the ERP systems used by many organizations to run their business. It is single source of information for all elements of supply chain. To implement ERP system, organizations have to pay huge cost. And it requires synchronization with hardware, operating systems and other telecommunication components. Many organizations have benefited after implementation of ERP systems but some enterprises experienced loss in their business because of improper implementation.

D. Radio Frequency Identification (RFID)

RFID is similar to Bar code. Bar code cannot uniquely identify objects like when item is produced and what is its expiry date. To overcome this, RFID was invented. To read RFID radio frequency signals are used. RFID is automatic identification system which is used to enable data to be transmitted through portable device named as Tag. Tag is read by RFID reader. Tag may contain various information such as color, date of manufacturing, location etc. Tag is microchip which is connected with small antenna.

E. Decision Support Systems

Decision support system is a system which supports organizations in decision making activities. This system helps decision makers to compile useful information from documents, raw data or business models to solve problem and to take decision. This system may gather information like current information assets, comparative figure of sales of consecutive weeks, projected figures of sales as per assumptions etc. DSS integrates various areas like inventory management, sales analysis, and logistics.

F. Web services

Web services are application interfaces accessible via Internet standards that use XML and employ at least one of the following standards: Simple Object Access Protocol (SOAP), Universal Description or Web Services Description Language (WSDL), Discovery and Integration (UDDI). All these standards and the next generation standards that are being built on them, define the way that forward-thinking enterprises manage the lightweight integration tasks. According to Sun Microsystems (2004), interoperability of web services for supply chain management is being used to support business-to-customer models. The computing giant provided an example in which retailers offer electronic goods to consumers. In order to fulfill orders, the retailer has to manage stock levels in warehouses. A typical business-to-business model is used when an item in stock falls below a certain threshold level. In this case the retailer must restock the item from the relevant manufacturer's inventory. In order to fulfil a retailer's request, the manufacturer has to execute a production run to build inventory of finished goods. The manufacturer has to order the component parts from its suppliers and that may be a manual process which is supported through the use of fax.

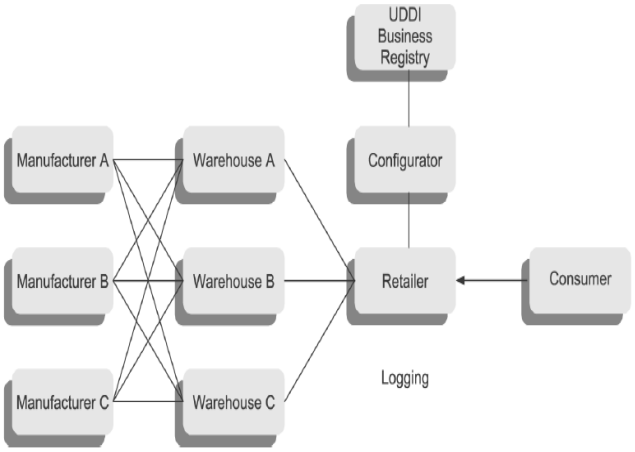

Fig 1: Web Services Architecture

ELECTRONIC COMMERCE

Electronic commerce refers to the wide range of tools and techniques used to run business in a paperless environment. Electronic commerce includes electronic data interchange, electronic fund transfers, e-mail, electronic publishing, electronic bulletin boards, image processing, shared databases and magnetic/optical data capture. Companies are able to automate the process of moving documents electronically between suppliers and customers. This automated system provides access to customers all over the world and eliminates geographical limitations. Some of the E-commerce applications with applications in Business to Consumer (B2C) and Business to Business (B2B) space, that are changing the dynamics of Supply Chain Management include:

E-tailing: using the internet for selling goods over the internet. The standard e-tailing application is that of a bookseller such as Amazon. The company is renowned for the fact that it only sells books over the internet. Customers of Amazon interact with its website and carry out a number of functions including:

- Reading feature articles about books and authors similar to those found in magazines and newspapers;
- Browsing readers' reviews of books;
- Tracking the progress of an order.
- Searching for details of a book based on information such as author's name or title of the book;
- Ordering books using credit cards or some other similar payment method;
- Browsing the books which are the Amazon bestsellers;

e- Procurement:

The term procurement is used to explain the purchase of goods and services which are indirectly used in the main business of company. For example, a car manufacturer procures stationery for its employees or procures training courses for them to attend and to improve their skills. An e-procurement system automatically takes the form produced by the person making the procurement, check that it satisfies all the company rules for procuring the required item, carries out authorization if it's below a certain defined limit or send the form to someone who can carry out authorization and then log the purchaser into the site of the supplier. And then that respective person is able to use this site to purchase, quoting an automatically generated procurement requisition number.

INVENTORY MANAGEMENT

Inventory is physical stock of goods which is important to run the business smoothly. Significant part of current assets and working capital is invested in inventory. Hence inventory control and management is very important. Main purpose of inventory management is to ensure availability of inventory in sufficient quantity so that it should be available when it is required and it will minimize the investment.

In supply chain management inventory management is an important tool. It touches every stage of operation.

Inventory management Techniques:

A. Economic Order Quantity:

Economic Order Quantity is a technique to determine optimum quantity of inventory which minimizes carrying cost. There are two costs related to inventory-inventory carrying cost and procurement cost. Procurement cost will be high if items are procured frequently in small lots. Inventory carrying cost decreases if quantity ordered per order is small. The right quantity which balances both is known as economic order quantity.

B. ABC analysis:

In this technique of inventory control, inventory is classified as follows:

1) A-Large investment items

2) C- Relatively small investment with large amount of items

3) B- Midway between A &C

Category A requires very tight control; C requires least control while B requires control less than A but more than B.

C. FSN Analysis

In this inventory management technique items are classified on the basis of their frequency of usage. FSN analysis classifies items as fast moving, slow moving and non-moving. FSN analysis is used in industry which deals with spare parts. In this to build inventory, previous customer orders for machines and spare parts are considered.

CONCLUSION

In this paper, the importance of supply chain management in industry has been explained. Various components are involved in the supply chain management which play an important role. So coordination is important to run supply chain smoothly. There are many problems faced by company due to improper supply chain. Role of information technology in supply chain is significant. Different information technology tools are used to run supply chain. Barcode is technology which requires line of sight that means scanner has to see barcode to scan or to read. RFID is another advanced technology in which scanners are able to scan the item within defined range. Barcodes are less secure than RFID.

Role of inventory is explained in this paper which proves the importance of inventory management in supply chain. Many inventory management techniques are available. EOQ gives quantity of inventory to be held by company to minimize the cost and to maximize the profit.

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