International Journal of Modern Engineering Research (IJMER)

www.ijmer.com Vol.1, Issue.2, pp-747-751 ISSN: 2249-6645

IMPORTANCE OF INFORMATION TECHNOLOGY FOR EFFECTIVE SUPPLY CHAIN MANAGEMENT

Prof. Himanshu S. Moharana[1], Dr. J.S. Murty[2], Dr. S. K. Senapati[3], Prof. K. Khuntia[1]

[1](Raajdhani Engineering College, Bhubaneswar, Odisha) India
[2](Ex-Head, Design, RRL, Bhubaneswar, Odisha) India
[3](Professor, Dept. of Mech. Engg., IGIT, Sarang, Odisha) India

ABSTRACT

In order to survive and beat the competition in today's competitive world, one has to manage the future. Managing the future means managing information. In order to deliver quality information to the decision-maker at the right time and in order to automate the process of data collection, collation and refinement, organizations have to make Information Technology an ally, harness its full potential and use it in the best possible way. IT is beneficial for cooperation and integration within the stakeholders of the supply chain.

***Keywords* – Coordination, Cooperation, Integration, Information Technology, SCM**

I. INTRODUCTION

Information technology is revolutionizing the way, in which we live and work. It is changing all aspects of our life style. The digital revolution has given mankind the ability to treat information with mathematical precision, to transmit it with high accuracy and to manipulate it. These capabilities are bringing into being, a whole world within and around the physical world. The amount of calculation power that is available to mankind is increasing at an exceptional rate and Computers and communication is becoming integral parts.

At the organizational level, IT should assist in specifying the objectives and strategies of the organization. IT should also aid in developing and supporting, and procedures to achieve them. At the departmental level, IT must ensure a smooth flow of information across departments, and should guide organization to adopt the most viable business practices. At this level, IT ensures seamless flow of information across the different departments and develops and maintains an enterprise – wide database. This database will eliminate the need of the isolated data islands that existed and in each department and make the organization's data accessible across the departmental boundaries. This enterprise–wide sharing has many benefits likes automation of procedures, availability of high quality information for better decision-making and faster response times.

II. INFORMATION TECHNOLOGY AND SUPPLY CHAIN

The supply chain management (SCM) is concerned with the flow of products and information between the supply chain members that encompasses all of those organizations such as suppliers, producers, service providers and customers. These organizations linked together to acquire, purchase, convert/manufacture, assemble, and distribute goods and services, from suppliers to the ultimate and users.

Today, information and technology must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information with the emergence of the personal computer, optical fiber networks, the explosion of the Internet and the World Wide Web. The cost and availability of information resources allow easy linkages and eliminate information-related time delays in any supply chain network. This means that organizations are moving toward a concept known as Electronic Commerce, where transactions are completed via a variety of electronic media, including electronic data interchange (EDI), electronic funds transfer (EFT), bar codes, fax, automated voice mail, CD-ROM catalogs, and a variety of others. The old "paper" type transactions are becoming increasingly obsolete. Leading-edge organizations no longer require paper purchase requisitions; purchase orders, invoices, receiving forms, and manual accounts payable "matching" process. All required information is recorded electronically, and associated transactions are performed with the minimum amount of human intervention. Recent developments in database structures allowed part

www.ijmer.com Vol.1, Issue.2, pp-747-751 ISSN: 2249-6645

numbers to be accumulated, coded, and stored in databases, and electronically ordered. With the application of the appropriate information systems, the need to constantly monitor inventory levels, place orders, and expedite orders will soon become a thing of the past.

III. IMPORTANCE OF INFORMATION

Information is the key to the decision making in Business. Prior to the 1980s, a significant portion of the information used to flow between functional areas within an organization, and between supply chain member organizations, were paper-based. In many instances, these paper-based transactions and communications were slow, unreliable, and error prone. Conducting business in this manner was costly because it decreased firms' effectiveness in being able to design, develop, procure, manufacture, and distribute their products. During this period, information was often overlooked as a critical competitive resource because its value to supply chain members was not clearly understood. However, firms that are embarking upon supply chain management initiatives now recognize the vital importance of information and the technologies that make this information available.

In a sense, the information systems and the technologies utilized in the supply chain represent one of the fundamental elements that link the organizations into a unified and coordinated system. In the current competitive climate, little doubt remains about the importance of information and information technology to the ultimate success, and perhaps even the survival, of any supply chain management initiative. Cycle time reduction, implementing redesigned cross-functional processes, utilizing cross-selling opportunities and capturing the channel to the customer.

Timely and accurate information is more critical now than at any time. Three factors have strongly impacted this change in the importance of information.

1) Satisfying customers have become something of a corporate obsession. Serving the customer in the best, most efficient and effective manner has become critical, and information about issues such as order status, product availability, delivery schedules, and invoices has become a necessary part of the total customer service experience.
2) Information is a crucial factor in the managers' abilities to reduce inventory and human resources requirements to a competitive level.
3) Information flows play an essential role in the strategic planning for and deployment of resources.

The need for virtually seamless bonds within and between organizations is a key notion in the essential nature of information systems in the development and maintenance of successful supply chain. That is, creating inter-organizational processes and link to facilitate delivery of seamless information between marketing, sales, purchasing, finance, manufacturing, distribution and transportation internally, as well as inter organizationally, to customers, suppliers, carriers across the supply chain will improve fill rates of the customers service, increase forecast accuracy, reduction in the total inventory and savings in the company's' transportation costs - goals which need to be achieved.

In fact, inaccurate or distorted information from one end of a supply chain to the other can lead to tremendous inefficiencies such as excessive inventory investment, poor customer service, lost revenues, misguided capacity plans, ineffective transportation, and missed production schedules. This is termed to be bullwhip effect, which is commonly being experienced by the consumer goods industries. Suitable technologies such as bar codes and scanners have been developed and applied in the portions of supply chain to remove inaccuracy.

IV. INTER ORGANIZATIONAL INFORMATION SYSTEM

In supply chain-management, the suppliers, producers, customers are the members and are linked through the ultimate level of integration. These members are continuously supplied with information in real time. The foundation of the ability to share information is the effective use of Information Technology within the supply chain. Appropriate application of these technologies provides decision makers with timely access to all required information from any location within the supply chain. Recognizing the critical importance of information in an integrated supply chain environment, many organizations are implementing some form of an inter-organizational information system (IOIS).

www.ijmer.com Vol.1, Issue.2, pp-747-751 ISSN: 2249-6645

An IOIS is an integrated data-processing/data-communication system utilized by two or more separate organizations. These organizations may have a preexisting business relationship. What must exist is a computer-based electronic link between the two organizations that automates some element of work, such as order processing, order-status, inventory-level review, and shipment tracking information or, minimally, transaction transfer, which would previously have been performed manually or through other media, such as the mail.

The development of an IOIS for the supply chain has three distinct advantages: cost reductions, productivity improvements, and product/market strategy. Five basic levels of participation for individual firms within inter organizational system are:

1) Remote I/O node, in which the member participates from a remote location within the application system supported by one or more higher-level participants.
2) Application processing node, in which the member develops and shares a single application such as an inventory-query or order-processing systems.
3) Multi participant exchange node, in which the member develops and shares a network inter-linking itself and any number of lower-level participants with whom it has an established business relationship.
4) Network control node, in which the member develops and shares a network with diverse applications that may be used by many different types of lower-level participants; and finally.
5) Integrating network node, in which the member literally becomes a data-communications/data-processing utility that integrates any number of lower-level participants and applications in real time.

The participant shares a network of diverse applications with any number of participants with whom it has an established business relationship. All relevant information ultimately must circulate to and among all organizations between the supply chain's point of origin and its point of consumption, such as ordering (i.e., orders for component parts, services, and finished products), inbound transportation, manufacturing, warehousing, inventory management, outbound transportation, sales, marketing, forecasts, and customer-service information. Although organizations recognize the importance of an IOIS for effective supply chain management, no standard approach is being utilized in terms of technology or information.

Information is of crucial importance in SCM cooperation because it is present in all three elements like cooperation, collaboration and integration of SCM the core SCM model. Some even see information as an independent production factor, in addition to the traditional production factors of material, capital, and human capital. In general, a distinction can be drawn between the volume of information and the richness of information exchanged. In the case of coordination, the amount of information exchanged is generally larger, whereas the information exchanged in collaborative relationships is richer. Evans and Wurster have differentiated between the reach of information and the richness of information. Reach refers to the number of people or companies exchanging information and therefore to connectivity. Richness is characterized by the dimensions bandwidth, customization, and interactivity. Data must be turned into information by being organized, modeled, formatted, edited, verified, placed in context, and delivered in a timely manner to decision makers before it takes on value. Davenport and Prusak have suggested the "five Cs" as methods to transform data into information. According to this, data has to be (1) contextualized, (2) categorized, (3) calculated, (4) corrected, and/or (5) condensed in order to become information.

Integrated and coordinated decisions in supply chain networks require a free flow of relevant information. Acknowledging the importance of information for SCM raises the question of how important it is. Many researchers have tried to capture the value of information by different methods. In order to determine the value of information, Li have examined twelve representative models. Based on their comparative analysis they conclude that information sharing has value for SCM, but also that it may not be the only way to achieve optimal performance. In general, suppliers gain higher profits than retailers by sharing information. In terms of relevant factors influencing the value of information sharing, they conclude that it is highly dependent on the specific supply chain situation.

Researchers have also provided an extensive

www.ijmer.com Vol.1, Issue.2, pp-747-751 ISSN: 2249-6645

literature review of a variety of models that investigate the impact of information sharing on performance in different settings. Again, depending on the specific settings, benefits vary, but in almost all models, information sharing improves supply chain cost performance directly or indirectly between 0% and 35%.

It has been found out that a quicker and more even flow of goods through the supply chain is more beneficial than information sharing. Achieving a quicker and more even flow of goods requires at least improved information processing capabilities and therefore information sharing also influences that indirectly. It is also acknowledged that in an environment with higher demand uncertainty, the value of information sharing may increase. Despite the proven impact of information sharing, Lee and Whang have pointed out that information sharing is only an enabler for better coordination and planning of the supply chain. Accordingly, companies must develop capabilities to make use of information.

Typically, the following types of information are of relevance (Lee and Whang),

- Inventory level: This includes all kinds of inventory, such as material, work in progress, finished goods, and goods in transit.
- Sales data: Ultimate sales data lessen the negative effects of distorted demand information when simulated with visible end consumer demand.
- Sales forecast: Since companies adapt their plans to their forecasts, it is important to share these expectations. If sales data are shared, every company in the supply chain could do their forecasts based on ultimate sales data. However, different methods might lead to differing results.
- Order status for tracking and tracing: This supports mainly customer service and reduces uncertainty in the supply chain and for the ultimate customer.
- Production and delivery schedules: The different tiers in a supply chain can align their operations to support the whole process if production and delivery schedules are shared, as is the case for just-in-time relationships.
- Capacity: Sharing capacity information, especially production and transportation capacities, can mitigate shortage and gaming behavior and supports supply chain planning.
- Performance metrics: This includes all performance metrics that are relevant for the whole process under consideration. Examples are quality data, lead times, queuing delays, and service performance, to name a few.

In addition to the points listed, cost accounting figures are also of high relevance. Information about selling price, salvage value, variable production cost, and fixed production cost, etc., are important to complete the informational foundation necessary for optimal decisions. However, this kind of information is highly sensitive. The benefits of such shared information are undisputed and all information mentioned before could be used in highly integrated and aligned organizations for better decisions. Nevertheless, there are obstacles that prevent companies from sharing such information. This is mainly based on the prevailing belief that information represents power and sharing it would lead to a loss of power and threaten the sharer's position in the supply chain. Traditionally, relevant information has been a substantial source of strategic advantage, which is in line with economic theory, where a monopolistic promises to retain all profits.
Profits associated with superior information are often referred to as informational rent. In such a constellation, however, available and retrievable information can only be exploited, but not properly leveraged. This is a major challenge for supply chains.

Another aspect of information sharing is the quality of shared information. Quality in general has many dimensions and its meaning depends highly on the context. One widely accepted definition of quality is provided by the International Organization of Standardization (ISO). They define quality as the degree to which a set of inherent features of a product or service fulfills customer requirements. In the context of SCM, quality can be interpreted as the fulfillment of customer requirements in terms of physical-functional specifications of products or in terms of an expected outcome of processes. Quality of

www.ijmer.com Vol.1, Issue.2, pp-747-751 ISSN: 2249-6645

information in supply chains can be interpreted similarly. In contrast to the customer orientation of entire supply chains, all supply chain members who rely on information are addressees, and therefore customers of information. Therefore, quality of information must be defined according to how the information is perceived and used by each supply chain member separately. Sometimes it has been presented ten dimensions of information quality that characterize the overall quality of information:

- Relevance: The information addressee's needs define the relevance of information. This does not mean that irrelevant information is of poor quality but in the wrong context, it might be irrelevant.
- Accuracy: Information should reflect the underlying reality. Problems may arise when information becomes too accurate for its purpose and lead to an information overload.
- Timeliness: In contrast, information can rarely be too timely. With time as an increasingly important competitive factor, the importance of fresh and up- to-date information increases too.
- Completeness: Completeness of information has to be seen in light of its context.
- Coherence: Though a separate dimension, it heavily relies on accuracy and/or timeliness. When information is incoherent, it usually is inaccurate and/or already too old.
- Format: The underlying form refers to the way information is presented.
- Accessibility: With increasing accessibility, the quality of information increases as well. Information that cannot be obtained when needed is of very limited value. Accessibility is strongly associated with timeliness of information.
- Compatibility: This refers to how well information can be processed with tools and combined with other information.
- Security: Security can be divided into logical security, which refers to fraud protection, and disaster recovery, which refers to natural disasters and facility failure.
- Validity: Information is valid when its truth can be verified and it satisfies appropriate standards related to the other dimensions.

V. CONCLUSION

It is confirmed that the importance of IT and quality of information are complementary to each other because manual filtering might disappear. Although automated information processing prevents manual mistakes, it also makes the process less transparent and therefore, wrong information or information of low value might be generated if the information input is already of bad quality and not properly checked. A distinction can be generated between the volume of information and the richness of information exchange. The sharing of information in systematic language involves more action and commitments support to enhance the quality of any organization which is beneficial in the light of supply chain network.

REFERENCE

[1] Lee, Hau L., V. Padmanabhan: *The bullwhip effect in supply chains, in: Sloan Management Review, Vol. 38 (1997), No. 3.*

[2] Chopra and Meindl: *Supply Chain Management: Strategy, planning and operation.*

[3] Evans, Philip B. and Thomas S. Wurster: *Strategy and the new economics of information, in: Harvard Business Review, Vol. 75 (1997)*

[4] Davenport, Thomas H. and Laurence Prusak: *Working knowledge: How organizations manage what they know, Boston, MA 1998.*

[5] Li, Gang et. al.: *Comparative analysis on value of information sharing in supply chains, in: Supply Chain Management: An International Journal, Vol. 10 (2005).*

[6] Lee and Whang: Information sharing in a supply chain, pp. 375-381.