Information Technology and Supply Chain Management

Dr Vikas Misra

Professor, Mechanical Engineering,

Geetanjali Institute of Technical Studies Udaipur,Rajasthan

ABSTRACT

Information is crucial to the performance of a supply chain because it provides the basis upon which supply chain managers make decisions. Information is very important factor & drives the entire Supply Chain System. Information Technology consists of the tools used to gain awareness of information, analyze this information, and act on it to improve the performance of the supply chain. The pressures of the global competition and the need for the extensive inter-organizational, collaboration is forcing industries to streamline their supply chains to make them agile, flexible and responsive. Effective use of information technology enables management to make decisions over a broad scope that crosses both functions and companies. Information Technology serves as the eyes & ears of the management in supply chain, capturing and analyzing the information necessary to make a good decision. This paper deals with integration of supply chains and specifically concentrates on the importance of distribution of information in the supply chain. This paper explores the significance of information, its uses and the technologies that enable supply chain managers to use information to make better decisions. The paper discusses how sharing and strategic utilization of information in a supply chain can radically improve execution of vital business processes and help in achieving shorter lead times, lower costs and inventory levels and finally better quality & customer satisfaction which is of utmost importance for the successfulness of the whole supply chain.

KEYWORDS :- Supply chain management, Information sharing, integration, internal supply chain management, business process renovation.

1. INTRODUCTION:-

Information is crucial to the performance of a supply chain because it provides the foundation on which supply chain processes execute transactions and managers make decisions. Without information, a manager will not know what customers want, how much inventory is in stock, and when more products should be produced and shipped. Information is the supply chain driver that serves as the glue allowing the other drivers such as inventory, transportation and facilities to work together to create an integrated, coordinated supply chain. In short, without information a manager can only make decisions blindly. Therefore information makes the supply chain visible to a manager. With this visibility, a manager can make decisions to improve the supply chain's performance. In many ways, the information is the most important of the four supply chain drivers because without it, none of the other drivers can be used to deliver a high level of performance. Given the role of a supply chain's success, managers must understand how information is gathered and analyzed. This is were Information Technology comes into play. Information Technology system consists of the hardware and software throughout a supply chain that gather, analyze and act on information. Information Technology serves as the eyes & ears (and some times a portion of the brain) of management in a supply chain, capturing and analyzing the information necessary to make good decisions. The paper studies about the importance of distribution of information in the supply chain. It also studies about how Information Technology tools enables supply chain managers to make better decisions over a broad scope that crosses both functions and companies. [1,2]

Using Information Technology systems to capture and analyze information can have a significant impact on a firm's performance. For example a major manufacturer of computer workstations and servers found that much of the information on customer demand was not being used to set production schedules and inventory levels. The manufacturing groups lacked this information, which forced them to make inventory and production

decisions blindly. By installing a supply chain software systems, the company was able to gather and analyze data to produce recommended stocking levels. Using the Information Technology systems enabled the company to cut its inventory in half because managers could make decisions based on information rather than educated guesses. [3] Large impact like this underscore the importance of Information Technology as a driver of supply chain performance. Information must have following characteristics to be useful when making supply chain decisions: -

(1)   Information must be accurate

(2)   Information must be accessible in a timely manner.

(3)   Information must be of the right kind.

Effective information sharing is a prerequisite for successful operation of supply chain in summary, information is crucial to making good supply chain decisions at all three levels of decision making (i.e. strategy, planning & operations) and in each of the other supply chain drivers (inventory, transportation and facilities). Information Technology enables not only the gathering of this data to create supply chain visibility, but also the analysis of this data so that the supply chain decisions made will maximize profitability.

2. SUPPLY CHAIN MANAGEMENT: -

Supply chain is a linked set of resources and processes that begins with the sourcing of raw materials and extends through the delivery of finished products to the final customer. (Bridgefeld Group ERP/ Supply Chain Glossary, 2004)

While the separation of supply chain activities among different companies enables specialization and economics of scale, there are many important issues and problems that need to be resolved for successful supply chain operation—this is the main purpose of supply chain management.

According to the *Global Supply Chain Forum (GSFC),* Supply Chain Management is defined as "the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customer and other stakeholders."(Chan & Qi, 2003). [1] We can only talk about Supply Chain Management, if there is a proactive relationship between a buyer and supplier and the integration is across the whole supply chain, not just first tier suppliers. (Cox, 2000). [3]

(McGuffog & Wadsley, 1999) has defined Supply Chain Management in a very comphrensive way. It states that Supply Chain Management is a set of synchronized decision & activities, utilized to effectively integrate suppliers, manufacturers, transporters, warehouses, retailers & customers so that the right product or service is distributed at the right quantities, to the right locations & at the appropriate time, in order to minimize system wide costs while satisfying customer service level requirements. It further says that Supply Chain Management is concerned with planning & coordinating activities right from procurement of raw materials to production of goods, leading finally to production of goods, with trillions of dollar traded in supply chains annually the impact of adopting better practices is tremendous.

There are several important issues in supply chain management that need to be resolved for efficient operation. Most of those problems stem either from uncertainties or inability to coordinate several activities and partners. (Turban, Mclean, & Wetherbe, 2004)

One of the most common problems in supply chains is the Bullwhip effect. Even small fluctuations in the demand or inventory levels of the final company in the chain are propagated and enlarged throughout the chain. Because each company in the chain has incomplete information about the needs of others, it has to respond with the unproportional increase in inventory levels and consequently even larger fluctuation in its demand to others down the chain. (Forrester, 1961; Forrester 1958).

Hence Supply Chain must be able to handle large numbers of events both expected & unexpected. The unexpected events, also called exceptions, typically arise because there is usually a gap between supply chain planning & execution.

3. SUPPLY CHAIN INFORMATION TECHNOLOGY FRAMEWORK: -

Given the wide range of information discussed earlier, it is important to develop a framework that helps a manager understand how this information is utilized by the various segment of Information Technology within the supply chain. Our vision of this framework is presented here. It is valuable to note that driver of Information Technology (IT) in the supply chain has increasingly been the enterprise software developed to enable processes both within and across companies. Enterprise software collects transaction data, analyzes this data to make decisions, and executes on these decisions both within an enterprise and across its supply chain. Certainly other parts of IT beyond enterprise software such as hardware, implementation services, and support are all crucial to making IT effective. Within a supplychain, however, the different capabilities provided by IT have as their most basic building block the capabilities of the supply chain's enterprise software. In many ways, software shapes the entire industry of IT as other components follow the software lead. The evolution of enterprise software provides insights not only into the future of IT, but also into what the key supply chain processes are.

The enterprise software Landscape became increasingly popular during late 2000. The unprecedented flow of venture capital into new software companies led not just to an increase in the number of software companies, but also to the proliferation of entire categories of softwares. The growth of enterprise software landscape is much more dynamic. What drives this evolution of the enterprise software landscape? Why are some categories of software companies headed for a profitable long- term future, whereas others have failed? Certainly there are a wide variety of factors affecting the natural selection of software companies. We propose, however, that three of the main drivers of the evolution taking place in enterprise software are the three major groups of supply chain processes, which we term supply chain macro processes. The successful categories of software will be those focused on macro processes. [4,5]

4. THE SUPPLY CHAIN MACRO PROCESSES:-

The scope of supply chain management has broadened the scope across which companies make decisions. This scope has expanded from trying to optimize performance across division, to the enterprise, and now to the entire supply chain. This broadening of scope emphasizes the importance of including processes all along the supply chain when making decisions. From an enterprise's perspective, all processes within its supply chain can be categorized into three main areas: Processes focused downstream, Processes focused internally, Processes focused upstream. We use this classification to define the three Macro Supply chain Processes as follows:

Customer Relationship Management (CRM): Processes that focus on downstream interactions between the enterprise and its customer.

Internal Supply chain Management (ISCM): Processes that focus on internal operations within the enterprise.

Supplier Relationship Management (SRM): Processes that focus on upstream interactions between the enterprise and its suppliers.

4.1 WHY FOCUS ON THE MACRO PROCESSES?

As the performance of an enterprise becomes more closely linked to the performance of its supply chain, it is crucial that firms focus on these processes. After decades of focusing on the internal processes, a firm must expand the scope beyond internal processes and look at the entire supply chain to achieve breakthrough performance. The goal should be to increase the total profitability of the supply chain (also referred as supply chain surplus). Good supply chain management is a positive sum game where supply chain partners can increase their overall level of profitability by working together. Therefore, to increase the supply chain surplus most effectively, firms must expand their scope beyond their enterprise and think in terms of all three macro processes. [10]

4.2 MACRO PROCESSES APPLIED TO EVOLUTIONOF SOFTWARE: -

As the downturn in technology spending has applied evolutionary pressure on the enterprise software landscape, we see a distinct pattern emerging. The majority of survivors have chosen to focus their products on improving their customer's macro processes. Some software firms cross over into more than one macro

process, whereas others only address a small portion of macro process. But the common theme we see is that to survive, and particularly to thrive, enterprise software firms must focus on one or more of these macro processes. Almost all areas of enterprise software growth exist within CRM, ISCM, or SRM.Both new companies and larger firms within enterprise software are now targeting these three macro processes much more sharply. In the future, we see the ability to improve the three macro processes driving the winners and losers in enterprise software.

ERP software has been successful in improving data integrity within the supply chain, but by itself, data integrity provides little value. The real value from having ERP systems in place can only be obtained if these systems can be used to improve decision-making in the three macro processes. Every major ERP player has realized this and is remaking themselves into a company emphasizing products focused on the macro processes. [5]

4.3 THE SOFTWARE WINNERS WITHIN A MACRO PROCESSES :-

Among software firms focused on a macro process, the following three factors determine their success;

(1)   Functional Performance

(2)   Integration with other macro processes

(3)   Strength of the software firm's ecosystem

Functional performance is important to customers because it provides them with capabilities to create a competitive advantage. In addition to create raw Functional performance, we believe that the ease of use is crucial to success in this category.

The ability to integrate is important to a customer for variety of reasons. Applications that are easy to integrate are generally easier to get implemented and producing value. Integration is also crucial across different macro processes. Applications that integrate across macro processes will be able to provide the benefits if making decisions for the extended supply chain.

Finally, a firm's ecosystem – the network of software partners and, more importantly, system integrators and installed base –provides assistance in selling and implementing software. Firms that work well with implementation partners and build up large group of customers trained on their solutions have built a highly defensible position. For a customer, a strong ecosystem means a strong network to provide support both during implementation and down the road. [6]

These criteria are also important for customers of supply chain software. These criteria are the key to success for software companies precisely because they improve supply chain performance for firms. Thus companies should evaluate software providers along these lines to find their choice of software vendor.

We now discuss each of the macro processes, what segments they consist of, who the players are, and what the future will look like.

4.4 CUSTOMER RELATIONSHIP MANAGEMENT (CRM): -

The CRM macro process consists of processes that take place between an enterprise and its customers downstream in the supply chain. The goal of CRM macro process is to generate customer demand and facilitate transmission and tracking of orders. Weakness in this process results in demand being lost and a poor customer experience because orders are not processed and executed effectively. The key processes under CRM are as follows:

ʃ   Marketing

ʃ   Sell

ʃ   Order Management

ʃ   Call/ Service center

The aforementioned CRM processes are crucial to the supply chain as they cover a vast amount of interaction between an enterprise and its customers. Thus the CRM macro process is the starting point when improving

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supply chain performance. It is also important to note that CRM process and CRM software must be integrated with internal operations to optimize performance.

The CRM software landscape consists of three categories of companies; the best-of-breed winner, the best-of-breed startups, & the ERP players. CRM is currently dominated by Siebel Systems, the sole company in the best-of-breed winner category. However, Siebel does face serious competition from both best-of-breed startups that emphasize functional expertise as well as from the ERP players, such as SAP, Oracle, and People soft, which provide a powerful integration story and strong ecosystems. Looking foreword, Siebel, the best-of-breed winner, provides a combination of superior functionality and a strong ecosystem within SRM. [9]

4.5 Internal Supply Chain Management (ISCM): -

ISCM is focused on operations internal to the enterprise. ISCM includes all processes involved in planning for and fulfilling a customer order. The various processes included in ISCM are as follows:

- Strategic Planning
- Demand Planning
- Supply Planning
- Fulfillment
- Field Service

Given that the ISCM macro process aims to fulfill demand that is generated by CRM processes, their needs to be strong integration between the ISCM and CRM macro process. Similarly the ISCM processes should have strong integration with the SRM macro process.

Successful ISCM software providers have helped improve decision making within ISCM processes. Like CRM, today's ISCM landscape consists of three categories--; the best-of-breed winner, the best-of-breed startups, & the ERP players. Unlike CRM, however there is not a clear leader. There are two best of breed winners, i2 Technologies and Manugistics, which were ISCM pioneers and are currently the functional leaders.

The best-of-breed ISCM players have the leading functionality, but lack strong integration and ecosystems. These companies have been working to offer more products in the SRM and CRM space to improve their integrated offering. The ERP player's advantages are their integrated product & their ecosystems, although some ERP player's functionality is becoming more and more competitive. There are some smaller players in ISCM taking advantage of new functionality that will remain viable, especially those targeting customers in specific industries that are very dependent on advanced functionality. [8]

4.6 SUPPLIER RELATIONSHIP MANAGEMENT (SRM): -

SRM includes those processes focused on the interaction between the enterprise and the suppliers that are upstream in the supply chain. There is a very natural fit between SRM processes and the ISCM processes as integrating supplier constraints is crucial when creating plans. The major SRM processes are as follows:

- Design Collaboration
- Source
- Negotiate
- Buy
- Supply Collaboration.

Significant improvement in supply chain performance can be achieved if SRM processes are well integrated with appropriate CRM and ISCM processes.

The SRM space has four groupings of competitors. There are two best-of-breed groups that focus exclusively on SRM, one focused on design collaboration and other focused on procurement. Leading Design Collaboration firms include Agile & Matrix One while leading procurement firm are Ariba and Commerce one. The third type of player in SRM is the best-of-breed ISCM vendor that has made the natural extension of

ISCM into SRM—companies such as i2 and Manugistics. Finally, the fourth category consists of the ERP players moving up into the macro processes again. SAP is the largest SRM player among the ERP player's vendors and has shown the most commitment to entering this space. SRM has already attracted all the big players from both ISCM & ERP.Therefore the future SRM landscape is likely to be dominated by one or two ISCM players and one or two ERP players. [9]

4.7 SUPPY CHAIN INFORMATION TECHNOLOGY IN PRACTICE :-

Although there are different sets of practical suggestions for each supply chain macro process, there are several general ideas that managers need to keep in mind when making a decision regarding supply chain IT.

(1) *Select an IT system that addresses the company's key success factor:* - It is important to select supply chain IT systems that are able to give a company an advantage in the areas most crucial to the success of the business. For instance, the ability to optimally set inventory levels is crucial in the PC business where product life cycles are short and inventory becomes obsolete very quickly.

(2) *Take incremental steps and Measure values:* - One-Way to help ensure success of IT projects is to design them so that they have incremental steps. For instance, instead of installing a complete supply chain system across your company all at once, start first by getting your demand planning up and running and then move on to supply planning. Along the way, make sure that each step is adding value through improvement in the performance of the three-macro processes.

(3) *Align the level of sophistication with the need for sophistication:* - Management must consider the depth to which an IT system deals with the firm's key success factors. Therefore, it is important to consider just how much sophistication a company needs to achieves its goals & then ensure that the system chosen matches that level.

(4) *Use IT systems to support decision making, not to make decisions:* - A mistake companies generally make is installing a supply chain system & then reducing the amount of managerial effort they spend on supply chain issues. Management must keep its focus on the supply chain because as the competitive & customer landscape changes, there needs to be a corresponding change in the supply chain.

(5) *Think about future:* -Although it is more difficult to make a decision about an IT system with the future in mind than the present, it is very important that the managers include the future state of the business in the decision process. If there are trends in a company's industry indicating that significant characteristics will become crucial in the future, managers need to make sure their IT choices take these trends into account. The key here is to ensure that the software not only fits a company's current needs but also, and even more important, that it will meet the company's future needs. [6,7]

5. CONCLUSION: -

The paper shows how sharing of information is essential in making good supply chain decisions because it provides the global scope needed to make optimal decisions. Information Technology provides the tools to gather this information and analyze it to make the best supply chain decisions. Information is the factual component on which the decisions of other supply chain drivers are based. Information Technology is a large enabler for effectively integrating the main macro processes of supply chain management. Effective and good Information Technology systems not only allow the collection of data across the supply chain, but also the analysis of decisions that maximize supply chain profitability.

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