Electronic Supply Chain Management and Model Development – Global Perspective*

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Abstract

In a fiercely competitive environment, Supply Chain has emerged as a key strategic competency. In today's environment, it is essential for all organizations to have an efficient supply chain. Supply chain includes all types of organizations engaged in transportation, warehousing, information processing, and materials handling. Sourcing, procurement, production scheduling, manufacturing, order processing, inventory management, warehousing, and, finally, customer service are the functions performed throughout the supply chain. The ultimate goal of SCM is to meet customers' demand more efficiently by providing the right product, in the right quantity, at the right location, on the right time, and in the right condition. Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operated independently. Present study divide the modeling approaches into three areas - Network Design, ``Rough Cut'' methods, and simulation based methods. Successful SCM requires a change from managing individual functions to integrating activities into key supply chain processes. Supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. The deductive supply chain integration model corresponds to the model of collaboration dimensions in this work as first dimension of collaboration is information integration, second dimension of collaboration is workflow coordination and synchronization or also called collaboration and the third dimension of optimal collaboration is through the creation of new business models.

Key words: SCM, Collaboration, Synchronization, EBS, CRM, EDI, Collaboration Marketplaces, Inventory Management.

Introduction

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firming other words a supply chain is characterized by the flow of goods, services, money, and information both within and among business entities including suppliers, manufacturers, and customers. It also includes all types of organizations engaged in transportation, warehousing, information processing, and materials handling. Sourcing, procurement, production scheduling, manufacturing, order processing, inventory management, warehousing, and, finally, customer service are the functions performed throughout the supply chain. The ultimate goal of SCM is to meet customers' demand more efficiently by providing the right product, in the right quantity, at the right location, on the right time, and in the right condition.

SCM aims four major goals: 1) waste reduction: 2) time compression; 3) flexible response; and 4) unit cost reduction. These goals have been articulated in several contexts associated with SCM, emphasizing the importance of both intra- and inter-firm coordination.

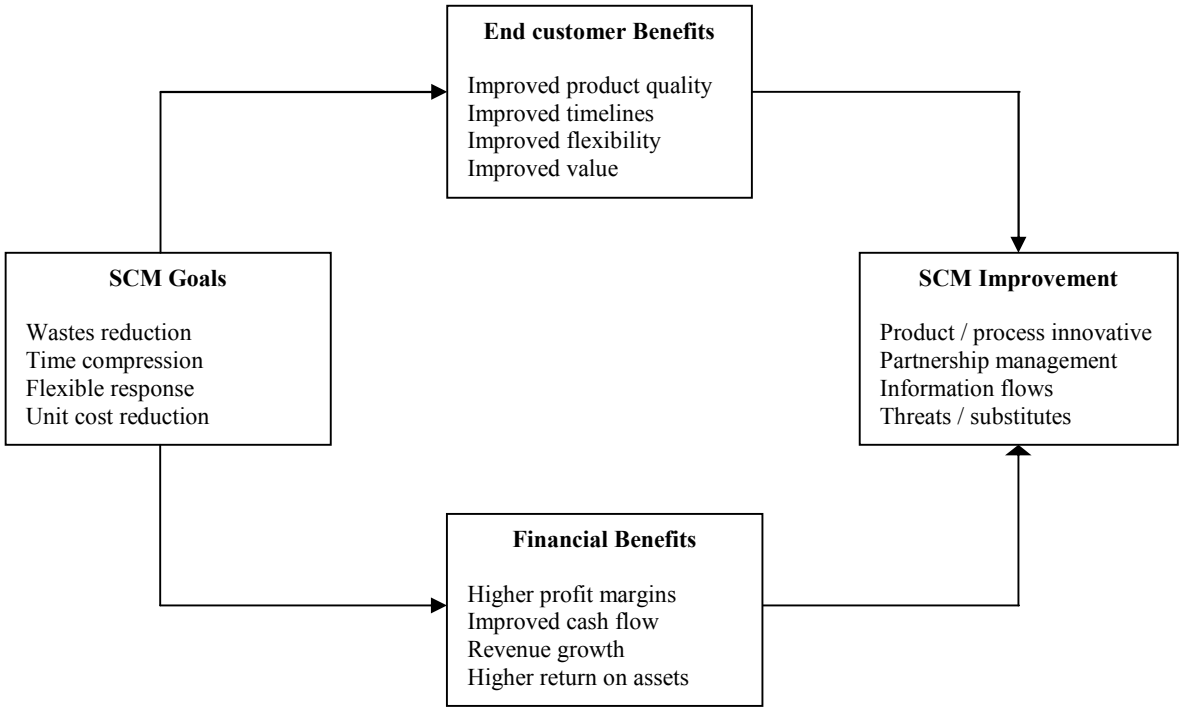

Figure 1: Supply Chain Management Framework : Source: Brewer & Speh, 2000

The example of a very simple supply chain for a single product, where raw material is procured from vendors, transformed into finished goods in a single step, and

then transported to distribution centers, and ultimately, customers. Realistic supply chains have multiple end products with shared components, facilities and capacities. The flow of materials is not always along an arborescent network, various modes of transportation may be considered, and the bill of materials for the end items may be both deep and large.

Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operated independently. These organizations have their own objectives and these are often conflicting. Marketing's objective of high customer service and maximum sales dollars conflict with manufacturing and distribution goals. Many manufacturing operations are designed to maximize throughput and lower costs with little consideration for the impact on inventory levels and distribution capabilities. Purchasing contracts are often negotiated with very little information beyond historical buying patterns. The result of these factors is that there is not a single, integrated plan for the organization---there were as many plans as businesses. Clearly, there is a need for a mechanism through which these different functions can be integrated together. Supply chain management is a strategy through which such an integration can be achieved.

Supply chain management is typically viewed to lie between fully vertically integrated firms, where the entire material flow is owned by a single firm, and those where each channel member operates independently. Therefore coordination between the various players in the chain is key in its effective management. Cooper and Ellram [1993] compare supply chain management to a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton, but the entire team needs to make a coordinated effort to win the race.

1. Supply Chain Decisions

We classify the decisions for supply chain management into two broad categories - strategic and operational. As the term implies, strategic decisions are made typically over a longer time horizon. These are closely linked to the corporate and guide supply chain policies from a design perspective. On the other hand, operational decisions are short term, and focus on activities over a day-to-day basis. The effort in these type of decisions is to effectively and efficiently manage the product flow in the "strategically" planned supply chain.

There are four major decision areas in supply chain management: 1) location, 2) production, 3) inventory, and 4) transportation (distribution), and there are both strategic and operational elements in each of these decision areas.

1.1 Location Decisions: The geographic placement of production facilities, stocking points, and sourcing points is the natural first step in creating a supply chain. The location of facilities involves a commitment of resources to a long-term plan. Once the size, number, and location of these are determined, so are the possible paths by which the product flows through to the final customer. These decisions are of great significance to a

firm since they represent the basic strategy for accessing customer markets, and will have a considerable impact on revenue, cost, and level of service. These decisions should be determined by an optimization routine that considers production costs, taxes, duties and duty drawback, tariffs, local content, distribution costs, production limitations, etc. (See Arntzen, Brown, Harrison and Trafton [1995] for a thorough discussion of these aspects.) Although location decisions are primarily strategic, they also have implications on an operational level.

1.2 Production Decisions: The strategic decisions include what products to produce, and which plants to produce them in, allocation of suppliers to plants, plants to DC's, and DC's to customer markets. As before, these decisions have a big impact on the revenues, costs and customer service levels of the firm. These decisions assume the existence of the facilities, but determine the exact path(s) through which a product flows to and from these facilities. Another critical issue is the capacity of the manufacturing facilities - and this largely depends the degree of vertical integration within the firm. Operational decisions focus on detailed production scheduling. These decisions include the construction of the master production schedules, scheduling production on machines, and equipment maintenance. Other considerations include workload balancing, and quality control measures at a production facility.

1.3 Inventory Decisions: These refer to means by which inventories are managed. Inventories exist at every stage of the supply chain as either raw materials, semi-finished or finished goods. They can also be in-process between locations. Their primary purpose to buffer against any uncertainty that might exist in the supply chain. Since holding of inventories can cost anywhere between 20 to 40 percent of their value, their efficient management is critical in supply chain operations. It is strategic in the sense that top management sets goals. However, most researchers have approached the management of inventory from an operational perspective. These include deployment strategies (push versus pull), control policies - the determination of the optimal levels of order quantities and reorder points, and setting safety stock levels, at each stocking location. These levels are critical, since they are primary determinants of customer service levels.

1.4 Transportation Decisions: The mode choice aspect of these decisions are the more strategic ones. These are closely linked to the inventory decisions, since the best choice of mode is often found by trading-off the cost of using the particular mode of transport with the indirect cost of inventory associated with that mode. While air shipments may be fast, reliable, and warrant lesser safety stocks, they are expensive. Meanwhile shipping by sea or rail may be much cheaper, but they necessitate holding relatively large amounts of inventory to buffer against the inherent uncertainty associated with them. Therefore customer service levels, and geographic location play vital roles in such decisions. Since transportation is more than 30 percent of the logistics costs, operating efficiently makes good economic sense. Shipment sizes (consolidated bulk shipments versus Lot-for-Lot), routing and scheduling of equipment are key in effective management of the firm's transport strategy.

2 Supply Chain Modeling Approaches

Organizations increasingly find that they must rely on effective supply chains, or networks, to compete in the global market and networked economy. In Peter Drucker's (1998) new management paradigms, this concept of business relationships extends beyond traditional enterprise boundaries and seeks to organize entire business processes throughout a value chain of multiple companies.

During the past decades, globalization, outsourcing and information technology have enabled many organizations, such as Dell and Hewlett Packard, to successfully operate solid collaborative supply networks in which each specialized business partner focuses on only a few key strategic activities. This inter-organizational supply network can be acknowledged as a new form of organization. However, with the complicated interactions among the players, the network structure fits neither "market" nor "hierarchy" categories (Powell, 1990). It is not clear what kind of performance impacts different supply network structures could have on firms, and little is known about the coordination conditions and trade-offs that may exist among the players. From a systems perspective, a complex network structure can be decomposed into individual component firms (Zhang and Dilts, 2004). Traditionally, companies in a supply network concentrate on the inputs and outputs of the processes, with little concern for the internal management working of other individual players. Therefore, the choice of an internal management control structure is known to impact local firm performance (Mintzberg, 1979).

In the 21st century, changes in the business environment have contributed to the development of supply chain networks. First, as an outcome of globalization and the proliferation of multinational companies, joint ventures, strategic alliances and business partnerships, significant success factors were identified, complementing the earlier "Just-In-Time", "Lean Manufacturing" and "Agile Manufacturing" practices. Second, technological changes, particularly the dramatic fall in information communication costs, which are a significant component of transaction costs, have led to changes in coordination among the members of the supply chain network (Coase, 1998).

Many researchers have recognized these kinds of supply network structures as a new organization form, using terms such as "Keiretsu", "Extended Enterprise", "Virtual Corporation", "Global Production Network", and "Next Generation Manufacturing System". In general, such a structure can be defined as "a group of semi-independent organizations, each with their capabilities, which collaborate in ever-changing constellations to serve one or more markets in order to achieve some business goal specific to that collaboration" (Akkermans, 2001). The security management system for supply chains is described in ISO/IEC 28000 and ISO/IEC 28001 and related standards published jointly by ISO and IEC.

Clearly, each of the above two levels of decisions require a different perspective. The strategic decisions are, for the most part, global or "all encompassing" in that they try to integrate various aspects of the supply chain. Consequently, the models that describe these decisions are huge, and require a considerable amount of data. Often due to the

enormity of data requirements, and the broad scope of decisions, these models provide approximate solutions to the decisions they describe. The operational decisions, meanwhile, address the day to day operation of the supply chain. Therefore the models that describe them are often very specific in nature. Due to their narrow perspective, these models often consider great detail and provide very good, if not optimal, solutions to the operational decisions.

To facilitate a concise review of the literature, and at the same time attempting to accommodate the above polarity in modeling, we divide the modelling approaches into three areas - Network Design, ``Rough Cut'' methods, and simulation based methods. The network design methods, for the most part, provide normative models for the more strategic decisions. These models typically cover the four major decision areas described earlier, and focus more on the design aspect of the supply chain; the establishment of the network and the associated flows on them. "Rough cut" methods, on the other hand, give guiding policies for the operational decisions. These models typically assume a "single site" (i.e., ignore the network) and add supply chain characteristics to it, such as explicitly considering the site's relation to the others in the network. Simulation methods are a method by which a comprehensive supply chain model can be analyzed, considering both strategic and operational elements. However, as with all simulation models, one can only evaluate the effectiveness of a pre-specified policy rather than develop new ones. It is the traditional question of "What If?" versus "What's Best?".

2.1 Network Design Methods: As the very name suggests, these methods determine the location of production, stocking, and sourcing facilities, and paths the product(s) take through them. Such methods tend to be large scale, and used generally at the inception of the supply chain. The earliest work in this area, although the term "supply chain" was not in vogue, was by Geoffrion and Graves [1974]. They introduce a multicommodity logistics network design model for optimizing annualized finished product flows from plants to the DC's to the final customers. Geoffrion and Powers [1993] later give a review of the evolution of distribution strategies over the past twenty years, describing how the descendants of the above model can accommodate more echelons and cross commodity detail.

Clearly, these network-design based methods add value to the firm in that they lay down the manufacturing and distribution strategies far into the future. It is imperative that firms at one time or another make such integrated decisions, encompassing production, location, inventory, and transportation, and such models are therefore indispensable. Although the above review shows considerable potential for these models as strategic determinants in the future, they are not without their shortcomings. Their very nature forces these problems to be of a very large scale. They are often difficult to solve to optimality. Furthermore, most of the models in this category are largely deterministic and static in nature. Additionally, those that consider stochastic elements are very restrictive in nature. In sum, there does not seem to yet be a comprehensive model that is representative of the true nature of material flows in the supply chain.

2.2 Rough Cut Methods: These models form the bulk of the supply chain literature, and typically deal with the more operational or tactical decisions. Most of the integrative research (from a supply chain context) in the literature seem to take on an inventory management perspective. In fact, the term "Supply Chain" first appears in the literature as an inventory management approach. The thrust of the rough cut models is the development of inventory control policies, considering several levels or echelons together. These models have come to be known as "multi-level" or "multi-echelon" inventory control models. Multi-echelon inventory theory has been very successfully used in industry. Cohen et al. [1990] describe "OPTIMIZER", one of the most complex models to date - to manage IBM's spare parts inventory. They develop efficient algorithms and sophisticated data structures to achieve large scale systems integration. Although current research in multi-echelon based supply chain inventory problems shows considerable promise in reducing inventories with increased customer service, the studies have several notable limitations. First, these studies largely ignore the production side of the supply chain. Their starting point in most cases is a finished goods stockpile, and policies are given to manage these effectively. Since production is a natural part of the supply chain, there seems to be a need with models that include the production component in them. Second, even on the distribution side, almost all published research assumes an arborescence structure, i. e. each site receives re-supply from only one higher level site but can distribute to several lower levels. Third, researchers have largely focused on the inventory system only. In logistics-system theory, transportation and inventory are primary components of the order fulfilment process in terms of cost and service levels. Therefore, companies must consider important interrelationships among transportation, inventory and customer service in determining their policies. Fourth, most of the models under the "inventory theoretic" paradigm are very restrictive in nature, i.e., mostly they restrict themselves to certain well known forms of demand or lead time or both, often quite contrary to what is observed.

Several models have been proposed for understanding the activities required to manage material movements across organizational and functional boundaries. SCOR is a supply chain management model promoted by the Supply Chain Council. Another model is the SCM Model proposed by the Global Supply Chain Forum (GSCF). Supply chain activities can be grouped into strategic, tactical, and operational levels. The CSCMP has adopted The American Productivity and Quality Center (APQC) Process Classification Framework. A high-level, industry-neutral enterprise process model that allows organizations to see their business processes from a cross-industry viewpoint.

3 Functions of SCM

Supply chain management is a cross-function approach including managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more cost effectively. The effect is

to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

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3.1 Strategic level

- Strategic network optimization, including the number, location, and size of warehousing, distribution centers, and facilities.
- Strategic partnerships with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third-party logistics.
- Product life cycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management activities.
- Information technology chain operations.
- Where-to-make and make-buy decisions.
- Aligning overall organizational strategy with supply strategy.
- It is for long term and needs resource commitment.

3.2 Tactical level

- Sourcing contracts and other purchasing decisions.
- Production decisions, including contracting, scheduling, and planning process definition.
- Inventory decisions, including quantity, location, and quality of inventory.
- Transportation strategy, including frequency, routes, and contracting.
- Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
- Milestone payments.
- Focus on customer demand and Habits.

3.3 Operational level

- Daily production and distribution planning, including all nodes in the supply chain.
- Production scheduling for each manufacturing facility in the supply chain (minute by minute).

- Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
- Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
- Inbound operations, including transportation from suppliers and receiving inventory.
- Production operations, including the consumption of materials and flow of finished goods.
- Outbound operations, including all fulfillment activities, warehousing and transportation to customers.
- Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers.
- From production level to supply level accounting all transit damage cases & arrange to settlement at customer level by maintaining company loss through insurance company.

4 Supply chain business process integration

Successful SCM requires a change from managing individual functions to integrating activities into key supply chain processes. An example scenario: the purchasing department places orders as requirements become known. The marketing department, responding to customer demand, communicates with several distributors and retailers as it attempts to determine ways to satisfy this demand. Information shared between supply chain partners can only be fully leveraged through process integration.

Supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow. However, in many companies, management has reached the conclusion that optimizing the product flows cannot be accomplished without implementing a process approach to the business. The key supply chain processes stated by Lambert (2004) are:

- Customer relationship management
- Customer service management
- Demand management
- Order fulfillment
- Manufacturing flow management
- Supplier relationship management
- Product development and commercialization
- Returns management

Much has been written about demand management. Best-in-Class companies have similar characteristics, which include the following: a) Internal and external collaboration b) Lead time reduction initiatives c) Tighter feedback from customer and market demand

d) Customer level forecasting. One could suggest other key critical supply business processes which combine these processes stated by Lambert such as:

4.1 Customer service management
4.2 Procurement
4.3 Product development and commercialization
4.4 Manufacturing flow management/support
4.5 Physical distribution
4.6 Outsourcing/partnerships
4.7 Performance measurement

4.1 Customer service management process: Customer Relationship Management concerns the relationship between the organization and its customers. Customer service is the source of customer information. It also provides the customer with real-time information on scheduling and product availability through interfaces with the company's production and distribution operations. Successful organizations use the following steps to build customer relationships:

- determine mutually satisfying goals for organization and customers
- establish and maintain customer rapport
- produce positive feelings in the organization and the customers

4.2 Procurement process: Strategic plans are drawn up with suppliers to support the manufacturing flow management process and the development of new products. In firms where operations extend globally, sourcing should be managed on a global basis. The desired outcome is a win-win relationship where both parties benefit, and a reduction in time required for the design cycle and product development. Also, the purchasing function develops rapid communication systems, such as electronic data interchange (EDI) and Internet linkage to convey possible requirements more rapidly. Activities related to obtaining products and materials from outside suppliers involve resource planning, supply sourcing, negotiation, order placement, inbound transportation, storage, handling and quality assurance, many of which include the responsibility to coordinate with suppliers on matters of scheduling, supply continuity, hedging, and research into new sources or programs.

4.3 Product development and commercialization: Here, customers and suppliers must be integrated into the product development process in order to reduce time to market. As product life cycles shorten, the appropriate products must be developed and successfully launched with ever shorter time-schedules to remain competitive. According to Lambert and Cooper (2000), managers of the product development and commercialization process must:

a. coordinate with customer relationship management to identify customer-articulated needs;
b. select materials and suppliers in conjunction with procurement, and

c. develop production technology in manufacturing flow to manufacture and integrate into the best supply chain flow for the product/market combination.

4.4 Manufacturing flow management process: The manufacturing process produces and supplies products to the distribution channels based on past forecasts. Manufacturing processes must be flexible to respond to market changes and must accommodate mass customization. Orders are processes operating on a just-in-time (JIT) basis in minimum lot sizes. Also, changes in the manufacturing flow process lead to shorter cycle times, meaning improved responsiveness and efficiency in meeting customer demand. Activities related to planning, scheduling and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites and maximum flexibility in the coordination of geographic and final assemblies postponement of physical distribution operations.
e) Physical distribution

This concerns movement of a finished product/service to customers. In physical distribution, the customer is the final destination of a marketing channel, and the availability of the product/service is a vital part of each channel participant's marketing effort. It is also through the physical distribution process that the time and space of customer service become an integral part of marketing, thus it links a marketing channel with its customers (e.g., links manufacturers, wholesalers, retailers).

4.5 Outsourcing/partnerships: This is not just outsourcing the procurement of materials and components, but also outsourcing of services that traditionally have been provided in-house. The logic of this trend is that the company will increasingly focus on those activities in the value chain where it has a distinctive advantage, and outsource everything else. This movement has been particularly evident in logistics where the provision of transport, warehousing and inventory control is increasingly subcontracted to specialists or logistics partners. Also, managing and controlling this network of partners and suppliers requires a blend of both central and local involvement. Hence, strategic decisions need to be taken centrally, with the monitoring and control of supplier performance and day-to-day liaison with logistics partners being best managed at a local level.

4.6 Performance measurement: Experts found a strong relationship from the largest arcs of supplier and customer integration to market share and profitability. Taking advantage of supplier capabilities and emphasizing a long-term supply chain perspective in customer relationships can both be correlated with firm performance. As logistics competency becomes a more critical factor in creating and maintaining competitive advantage, logistics measurement becomes increasingly important because the difference between profitable and unprofitable operations becomes more narrow. A.T. Kearney Consultants (1985) noted that firms engaging in comprehensive performance measurement realized improvements in overall productivity. According to experts, internal measures are generally collected and analyzed by the firm including

a. Cost
b. Customer Service
c. Productivity measures
d. Asset measurement, and
e. Quality.

External performance measurement is examined through customer perception measures and "best practice" benchmarking, and includes 1) customer perception measurement, and 2) best practice benchmarking.

4.7 Warehousing management: As a case of reducing company cost & expenses, warehousing management is carrying the valuable role against operations. In case of perfect storing & office with all convenient facilities in company level, reducing manpower cost, dispatching authority with on time delivery, loading & unloading facilities with proper area, area for service station, stock management system etc.

Components of supply chain management are as follows: 1. Standardization 2. Postponement 3. Customization

5 Components of supply chain management integration

The SCM components are the third element of the four-square circulation framework. The level of integration and management of a business process link is a function of the number and level, ranging from low to high, of components added to the link (Ellram and Cooper, 1990; Houlihan, 1985). Consequently, adding more management components or increasing the level of each component can increase the level of integration of the business process link. The literature on business process re-engineering, buyer-supplier relationships, and SCM suggests various possible components that must receive managerial attention when managing supply relationships. Lambert and Cooper (2000) identified the following components:

- Planning and control
- Work structure
- Organization structure
- Product flow facility structure
- Information flow facility structure
- Management methods
- Power and leadership structure
- Risk and reward structure
- Culture and attitude

However, a more careful examination of the existing literature leads to a more comprehensive understanding of what should be the key critical supply chain components, the "branches" of the previous identified supply chain business processes, that is, what kind of relationship the components may have that are related to suppliers and customers. Bowersox and Closs states that the emphasis on cooperation represents the synergism

leading to the highest level of joint achievement (Bowersox and Closs, 1996). A primary level channel participant is a business that is willing to participate in the inventory ownership responsibility or assume other aspects of financial risk, thus including primary level components (Bowersox and Closs, 1996). A secondary level participant (specialized) is a business that participates in channel relationships by performing essential services for primary participants, including secondary level components, which support primary participants. Third level channel participants and components that support the primary level channel participants and are the fundamental branches of the secondary level components may also be included.

Consequently, Lambert and Cooper's framework of supply chain components does not lead to any conclusion about what are the primary or secondary (specialized) level supply chain components (see Bowersox and Closs, 1996, p. 93). That is, what supply chain components should be viewed as primary or secondary, how should these components be structured in order to have a more comprehensive supply chain structure, and how to examine the supply chain as an integrative one (See above sections 2.1 and 3.1).

Reverse supply chain Reverse logistics is the process of managing the return of goods. Reverse logistics is also referred to as "Aftermarket Customer Services". In other words, any time money is taken from a company's warranty reserve or service logistics budget one can speak of a reverse logistics operation.

Supply chain systems and value: Supply chain systems configure value for those that organise the networks. Value is the additional revenue over and above the costs of building the network. Co-creating value and sharing the benefits appropriately to encourage effective participation is a key challenge for any supply system. Tony Hines defines value as follows: “Ultimately it is the customer who pays the price for service delivered that confirms value and not the producer who simply adds cost until that point”

Global supply chain management: Global supply chains pose challenges regarding both quantity and value:

Supply and value chain trends

- Globalization
- Increased cross border sourcing
- Collaboration for parts of value chain with low-cost providers
- Shared service centers for logistical and administrative functions
- Increasingly global operations, which require increasingly global coordination and planning to achieve global optimums
- Complex problems involve also midsized companies to an increasing degree,

These trends have many benefits for manufacturers because they make possible larger lot sizes, lower taxes, and better environments (culture, infrastructure, special tax

zones, sophisticated OEM) for their products. Meanwhile, on top of the problems recognized in supply chain management, there will be many more challenges when the scope of supply chains is global. This is because with a supply chain of a larger scope, the lead time is much longer. Furthermore, there are more issues involved such as multi-currencies, different policies and different laws. The consequent problems include:1. different currencies and valuations in different countries; 2. different tax laws (Tax Efficient Supply Chain Management); 3. different trading protocols; 4. lack of transparency of cost and profit.

The present study explores the use of different approaches and structures to facilitate coordinating a set of strategic business partners across multiple tiers of a single supply chain/Value Chain defined as the supply network. The study is based on a deductive model of three dimensions of coordination, corresponding to the information, material, and financial dependencies and knowledge transformation in terms of market level, managerial level and technological level between organizations in a supply network. This segmentation allows separate exploration of collaborative structures at the level of information systems, logistics and operations within the supply network.Application of Information Technologies in collaborative business management wherein sales and procurement have traditionally been concerned with proprietary channels characterize by long-term relationship. Today the Internet is completely reshaping this environment. Garment companies can now buy and sell across a wide variety of internet enabled market places ranging from independent and private exchanges referred to be market places and exchanges. The goal is to get participators from bottom tier of supply base to outsource their purchasing effort. The collaboration, programme development and design and problem solving are the issues addressed by collaborative planning, fulfillment management.

Collaborative planning has the ability to transfer critical planning information concerning forecasts, sales, demand, supply requirement and new product introduction. Such information is strictly reserved for internal strategic planning function. But today it is not the case, as many organizations increasingly outsource non-core functions to network partners. The ability to transfer planning information online and real time to what is rapidly becoming a virtual supply chain is being practiced by virtual enterprises (VEs) across various tiers. Many garment manufacturing and exporters in India responded to a need for greater planning collaboration. The state of the art supply chain planning software provides employees with the ability to access and manage information about product forecasting, availability and deployment through out supply chain process. The result is that garment companies can track inventory levels and sources of supply to evaluate options and make joint decisions quickly and refresh the supply chain database as needed. In the present study it is found that 72 per cent of the sample units which are large scale units possessing centralized data base system to share information across different business functions. Remaining 28 per cent of the sample units, which are small-scale units and are not possessing, centralized database system. Therefore SCM model must have single database to coordinate the three kinds of flow in supply chain management.

Figure-2 illustrates graphical representation of three collaboration steps among a set of mutually dependent and strategically important business partners.

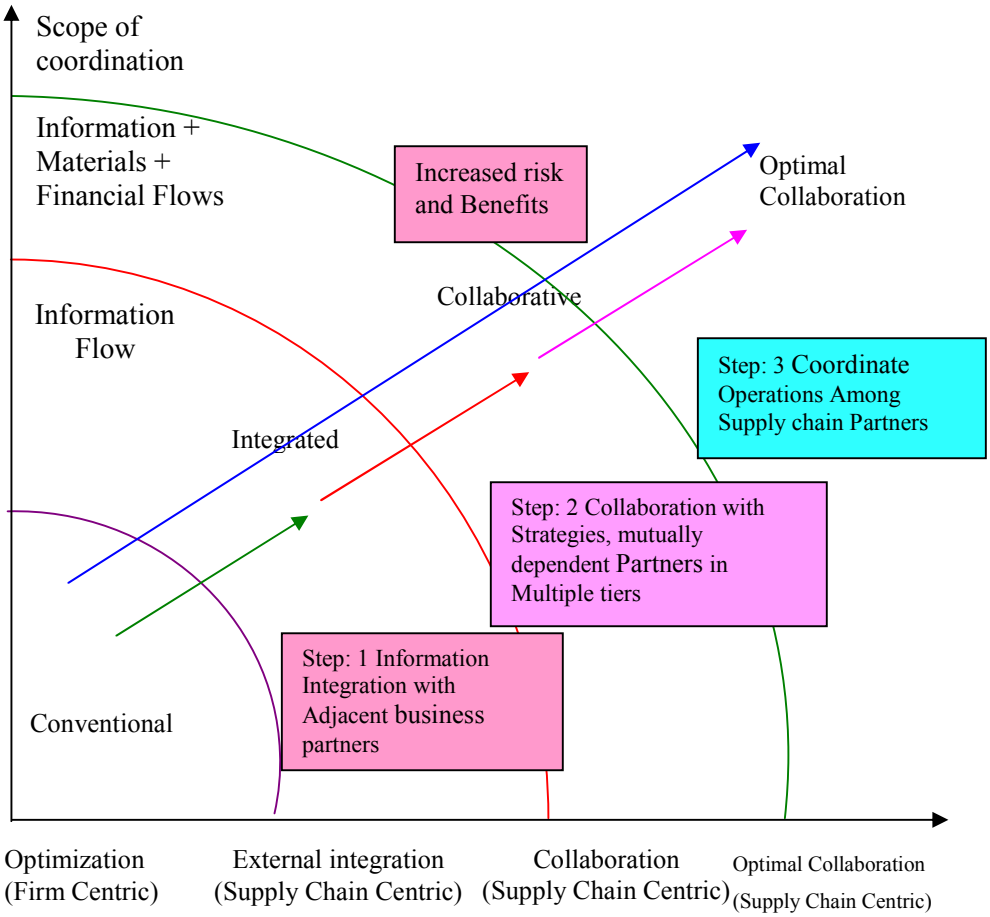

Figure 2 Steps in Supply Network collaboration

Source: Author

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The impact of strategic SCM model can be recognized in the heightened level of channel connectivity of four key supply chain value enhancing activities. Channel supplier management shifts the focus from company centric to value added sourcing, negotiation and payment cost reduction through supplier logistic integration to benefit the individual company as well as the entire supply chain. The other groups such as the channel support services and channel customer management moves behind limited sharing of customer databases, applying the best practices to improve internal order fulfillment, managing fixed product lines and pursuing average service for average customers to facilitating supply channel fulfillment. The synergy created enables garment companies to dramatically improve revenues, costs and asset utilization behind internal capabilities and resources.

Finally SCM provides today's supply chain with the means to realize the strategic possibilities of original SCM model. The model is made efficient and effective with the mechanism adopted by today's technologies such as Enterprise Resource Planning (ERP). Electronic Data Interchange (EDI) imposed severe limits to the range of information communication and selected unscalable barriers. Laboring under the limitations of intranet and extranet technology tools, the best textile and garment companies could hope to accomplish the task of transmitting a narrow band of information from a narrow group of supply partners to a whole of new dimension of SCM. This integrated approach can be global, 24/7/365, with 100 per cent accuracy. Enabling the full power of SCM requires the mechanism that would provide the interlocking connectivity between business systems through private Value Added Networks (VAN) such as mobile, telephone and ad-hoc computing networks technologies.

The concept of continuous regeneration of networks of business implies that successful supply channel is constantly coping up to the dynamic nature of today's ceaseless demand for new forms of customer supplier collaborations. The digital, real-time synchronization are the technology process enablers that network internal enterprises system, decision support tools, and data warehouses. Java, Extinguishable Markup Language (XML) and other e-commerce and Internet technologies have now made it possible to optimize the e-SCM competencies.

What was always needed was a way to make information available to the entire supply network at a very low threshold of cost and effort, but which, at the same time, enabled channel partners to use it to execute strategic decisions. This requirement for low cost and dramatically simple connectivity burst upon the scene in the form of internet.

Garment companies have looked to the computer to drive the collection, computation, dissemination, and decision-making power of business information. The requirement was straightforward and clears how to capture and utilize the information that is generated by the interplay of demand and supply, as it flows through the enterprise out to the customers and suppliers, who operate on the borders of the business. In the beginning, the first computerized applications for such areas as payroll, general ledger, customer billing, and inventory, were stand-alone systems, each having its own application logic, database, and user interface. While automating time-consuming clerical tasks, the value of these systems was limited to the specific business areas they were designed for. They were useless when it came to coordinating activities across different departmental functions.[1]

Business system software companies began to offer solutions that increasingly focused on linking departmental functions around a common database. Beginning first as Manufacturing Resource Planning (MRP II) and then Enterprise Resource Planning (ERP), these systems were an adaptation and refinement of earlier computerized applications. Today, the theory and practical use of ERP-type systems have so

[1]For an interesting summary of early software systems see Davenport. Thomas H., Mission Critical: Realizing the Promise of Enterprise Systems, Harvard Business School Press, 2000, 1-54.

transcended their origins that it would be more appropriate to call them enterprise business systems (EBS). Whether "homegrown" or purchased from a software developer, applications originating in these systems support a wide spectrum of businesses, from manufacturers to nonprofit organizations, from universities to government agencies.

According to one group of experts,[2] the most significant aspect of an effective EBS can be found in its ability to organize, codify, and standardize an enterprise's business processes and data. The goal of the EBS is to optimize an enterprise's internal value chain by integrating all aspects of the business, from purchasing and inventory management to sales and financial accounting. By providing a common database and the capability to integrate transaction management processes, data is made instantaneously available across business functions, enabling the visibility necessary for effective planning and decision-making. In addition, by providing for information commonality and integration, an EBS eliminates redundant or alternative information management systems and reduces non-value-added tasks, thereby dramatically impacting a company's productivity.

There are several other benefits gained by implementing an EBS. As garment companies continually grapple with engineering continuous change, many project strategists are looking to the suite of "best practice" process designs embedded in today's EBS business function work flows. While the software should be flexible enough to fit the business, often-existing operating processes are ill defined or obsolete, and the construction of building them around the capabilities of resident business applications facilitates new processes. Finally, as the basis of business changes to meet new challenges, garment companies with standardized processes driven by an EBS are more adaptable to change. Paradoxically, as Davenport points out.[3] "Standardization can lead to increased flexibility." A single, logically structured, and common information system platform is far easier to adapt to changing circumstances than a mixture of systems with complex interfaces linking them together.

6 Mechanisms and Architecture of Enterprise Business System

Today's EBS architecture has been expanded to include customer relationship management (CRM), supply chain management (SCM)/Value Chain Management and Web-based tools either embedded in the software, its primary role is to serve as the hub or the "backbone" of the enterprise's information infrastructure. An effectively implemented and utilized EBS links the different functions of the business, drives continuous improvement and process efficiency and effectiveness, provides the mechanism to support company strategies, and enables the pursuit of business technologies.

As illustrated in Figure 3 an EBS can be described as having two major elements-the system architecture and up to eight tightly integrated business modules. The system architecture determines the technical component of the system. In the narrow sense, EBS

[2] Norris, Grant, Hurley, James R. Hartley, Kenneth M., Dunlcavy. John R., and Balls, John D., E-Business and ERP: Transforming the Enterprise, John Wiley & Sons, Inc., New York, 2000, 13.

[3] Davenport, 23

architecture refers to the hardware configuration, programming languages, graphic presentation, document output capabilities, and database designs available in the system. In a wider sense, architecture refers to the choice of how the EBS is assembled. It can be composed of a homogenous, fully integrated business software system that, in today's software environment, will include PC-based, memory-resident tools, such as advanced planning and scheduling (APS) and supply chain management (SCM), as well as e-commerce functions. or, Textile-garment companies may elect to assemble a best-of-breed portfolio model linking third-party point solutions, such as customer relationship management (CRM). To a home-based or previously implemented packaged solution.

The second element of an EBS is the array of eight possible business applications that an enterprise might deploy. The eight applications are described as customer management, manufacturing, procurement, logistics, product data, finance, asset management and human resources. Depending on the nature of the business, an enterprise may utilize some or all of the modules. For example, the EBS of a garment manufacturing company that performs distribution functions will have all eight modules activated. A wholesaler would have all except for manufacturing related functions.

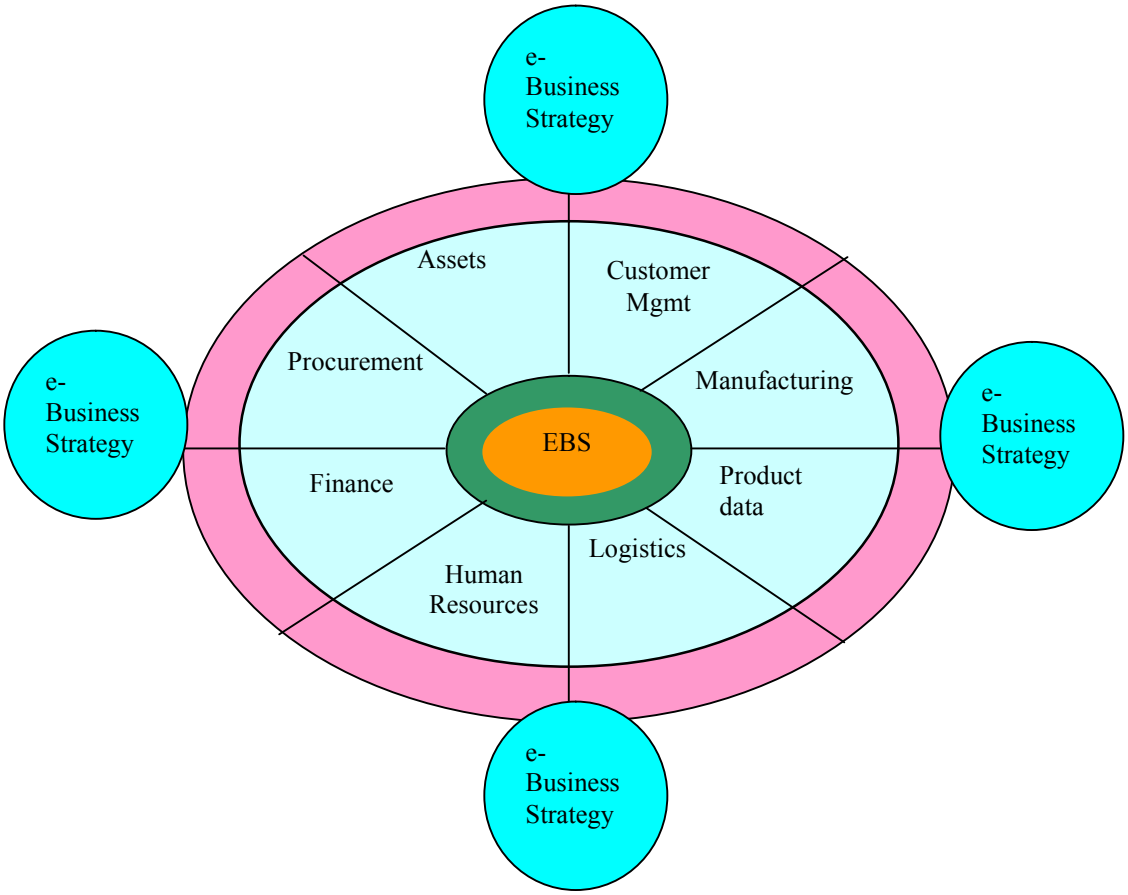

Figure 3: Enterprise Business System

Source: Author

A dot-com catalogue business would most likely have customer management, asset, human resources, finance, and perhaps procurement and logistics functions. Regardless of the business environment, every company will at least have to install customer service, finance, and asset modules. These core functions would be difficult to outsource without losing corporate integrity. A description of each of the eight modules is as follows:

Customer management: The primary role of this module in an EBS is to provide access to the presentation screens that enable order entry, order promising, and open order status maintenance. Order entry and ongoing service maintenance is the gateway to the sales and marketing database. Second, this module should provide the data necessary to perform real-time profitability analysis to assist in calculating costs, revenues and sales volumes necessary for effective quotation and ongoing customer maintenance. Third, a well-designed EBS will provide marketers with tools to design sophisticated pricing schemes and discount models. In addition, the software should permit the performance of miscellaneous functions such as order configuration, bonus and commissions, customer delivery schedules, global tax management, customer returns, and service and rental. Finally, the customer database should be robust enough to permit the generation of sales budgets for forecast management and the generation of statistical reporting illustrating everything from profitability to contributing margins analysis. It is found that 75 per cent of the sample garment units opined that Internet has benefited the garment organization in customer management

Manufacturing: Functions in this module comprise most of the foundation applications in the suite of a modern day EBS. Originating as a bill of material (BOM) processor, this module has been enhanced over the decades to include MRP processing, manufacturing order release, work-in-process (WIP) management, cost reporting, and overall shop floor control. A critical integrative aspect is the real-time linkage of demand to supply management facilitating order-to-production and WIP modeling while promoting real-time available-to-promise (ATP) to assist in customer order management. In addition to these basic tools, today's EBS manufacturing module also contains functionality for activities such as inspection, project management, capacity/resource management and the compilation of production statistics. Finally, advances in technology have enabled the configuration of basic EBS applications with "bolt-on" data collection devices and advanced planning and optimizing software. It is found that 26 per cent of the sample units have implemented Collaborative planning Forecasting Replenishment (CPFR) and are very satisfied.

Procurement: In today's business climate the ability to effectively integrate procurement requirements with a variety of supplier management concepts and technology tools is one of the most important components of an effective EBS. Although much press has been given to Web-based B2B technologies, basic management of procurement requires a close integration with internal MRP and maintenance, repair, and operations supplies (MRO) systems. Today's EBS contains robust functionality to facilitate purchase order processing, delivery scheduling, open order tracking, receiving, inspection, and supplier statistics and performance reporting. In addition, detailed

requests for quotation must be available that tie back to customer demands and extend out to supplier management, negotiation, and pricing capabilities. Finally, the system architecture must include electronic data interchange (EDI) capabilities. It is found that 37 per cent of the garment manufacturers buy more than 28 per cent of the input supplies like fabric, accessories, and chemicals, yarns and etc in business to business (B2B) environment through online.

Logistics: The ability to link in real-time logistics functions to sales, manufacturing, and finance is fundamental to competitive advantage in the twenty-first century. Today's EBS must provide the mechanism to run the internal supply chain of the business as well as provide the necessary connectivity to remote trading partners located on the rim of the supply network. Critical tools in the module center on distribution channel configuration, warehouse activity management, channel replenishment planning and distribution order management, and the generation of distribution, asset, and profitability reporting. Also, of growing importance is the integration of EBS functions with "bolt-on" warehouse and transportation management systems, as well as applications supporting Web-based (RFID) customer and supply chain management systems. In the present study it is found that 82 per cent of the sample units are using Internet for logistics support on line.

Product data: At the core of manufacturing and distribution information systems reside the databases describing the products that they build and distribute. Often considered highly proprietary, these databases contain data ranging from engineering descriptions to details concerning cost, sources of acquisition, planning data, and product structure details. Besides obvious uses for inventory and manufacturing planning and shop floor management, these databases are critical for marketing product life cycle management analysis and costing, engineering product introduction, and financial reporting and analysis. As the speed of time-to-market and ever shortening product life cycles accelerate, progressive. Garment companies have been looking to channel partners to implement collaborative technologies through the Internet that can link in real-time computer-aided design (CAD) and design documentation in an effort to compress time out of development, introduction, and phase-out of products and services. It is found that 95 per cent of the respondents opined that Product (Apparel) quality is most important competitive factor.

Finance: Without a doubt, one of the strong-suites of an EBS is its ability to support effective management accounting. In fact, one of the criticisms leveled at EBS is that it is really an accounting system, requiring everyone in the business to report on an ongoing basis each transaction they perform with 98 per cent accuracy. Today's financial applications provide for the real-time reporting of all transaction information originating from inventory movement, accounts receivable, accounts payable, taxes, foreign currency and journal entries occurring with in the enterprise. The more timely and accurate the posting of data, the more effective are the output reports and budgets that can be used for financial analysis and decision-making at all levels in the business. It is found that 74 percent of the respondents use this module for accounting information.

Assets: Effective control of a garment company's fixed assets and current assets are essential to ensuring continuous planning of the productive resources necessary to meet competitive strategies. EBS databases in this module center on the establishment of equipment profiles, diagnostics and preventive maintenance activities, and financial tracking must be properly integrated externally and internally as well. It is found that 76 per cent use this module to track and trace of goods (assets).

Human resources: The final module composing a modern EBS is the management of an enterprise's people resources. Functions in this area can be broken down into two main areas. The first is concerned with the performance of transaction activities, such as time and attendance reporting, payroll administration, compensation, reimbursable expenses, and recruitment. The second is focused on the creation of databases necessary to support employee profiles, skills and career planning, and employee evaluations and productivity statistics. Despite the obvious benefits, implementing an EBS is not without risk. Over the past 26 years business system legends are supplied with horror stories of EBS implementation failures. While offering a broad band of opportunities, unprepared garment companies have encountered a host of problems as it is evidenced from the present study that garment company's customized ERP packages may not be so compatible with other web based technologies therefore some of the software packages need to be evolved to fit into the requirement of customer. Middleware and distributed technologies are yet to see their final destination. In the present study it is found that HRM component is useful for the model by 79 per cent in garment companies.

Change management: Perhaps the most difficult aspect of implementing a full or partial EBS is the dramatic element of organizational and cultural change that many garment companies must undergo on the road to installation. Old work habits, time worn organizational rules, departmental turfs, and other workday patterns are severely stressed as the entire enterprise must learn how to work as a single team, utilizing a single data base to make decisions impacting each area of the business. Respondents were asked whether they are benefited from the initiate change component of SCM model that utilize a single database for initiating change in the system, 93 per cent of the respondents opined that initiate change component is beneficial.

Cost: The costs associated with an EBS implementation can be staggering. The cost of just the hardware and software can be enormous. It is estimated that spending in this area in 2008 was in excess of $90 billion worldwide. Professional services fees for the same period were well over $15 billion. To this cost, must then be added expenditures for Internet. Web site and electronic commerce initiatives.

Inflexibility: Many garment companies argue that they are forced to change operating processes unduly, just so they can use EBS applications. What is even worse, once installed, the EBS is difficult to change as the nature of the business changes. Although today's best packages enable the software and not the company to adapt to the operating environment, often the requirement to migrate, even to a "best practices" process, can cause considerable alarm in even the best-run organization. EBS architectures are undergoing metamorphosis as they migrate from inward-focused transaction management

systems to outward-focused. Internet-enabled technologies providing connectivity up and down the supply chain. Simply put, while tomorrow's EBS may be radically different architecturally, nevertheless, the backbone business functionality will still be that of today's EBS.

Despite the tremendous planning and control opportunities an EBS provides for the typical enterprise, doing business in today's internet world has imposed a number of critical requirements that EBS architectures and founding concepts were never designed to address. This does not mean, however, that EBS is obsolete. Garment companies of the future will still have to manage sales, perform transactions, cost inventory, pay personnel, and a host of other functions that are simply a part of doing business, and that is what an EBS does best. However, as will be detailed in the next section, the needs of collaborative business. Web-based technologies, synchronized supply chains and other issues are requiring businesses not to abandon, but to extend basic EBS, by incorporating today's newest technologies and thinking. Such an enterprise is what can be seen as a permanent attribute of EBS architecture it has been and continues to be preeminently an adaptive technology capable of changing and merging with breakthroughs occurring both in business management and application hardware and software.

7 Effect of Internet Commerce on Business Model

Limitations in computer architecture and communications devices forced even the most technically savvy garment companies to remain fairly concentrated on streamlining and integrating internal business functions. Although tools fostering business-to-business connectivity, such as EDI, were slowly growing, the enterprise-centric and proprietary nature of computing in this period was often sub optimized by the inability of systems to interconnect with vital information occurring out in the business network. Even simple data components, like inventory balances or forecasts, were communicated with great difficulty to sister warehouses or divisions, let alone to trading partners whose databases resided beyond the barriers of their own information systems. The idea that garment companies depended on their customer and suppliers, that considerable competitive advantage could be gained by working in closely structured collaborative partnerships, was always part of the business landscape far before the World Wide Web was even dreamt of. As illustrated in Figure 4, garment companies recognized that the span of their business universe extended beyond the range of their immediate planning and control systems to their customers, trading partners, suppliers and distribution channel networks. The problem was that the mechanism necessary to generate the gravitational pulls binding the outside spheres to a single supportive system consisted, for the most part, of handshakes revolving around formal or implied contracts. Data transmission was purely a manual affair, and because of the nature of the business philosophies of the time, shared only with the greatest reluctance.

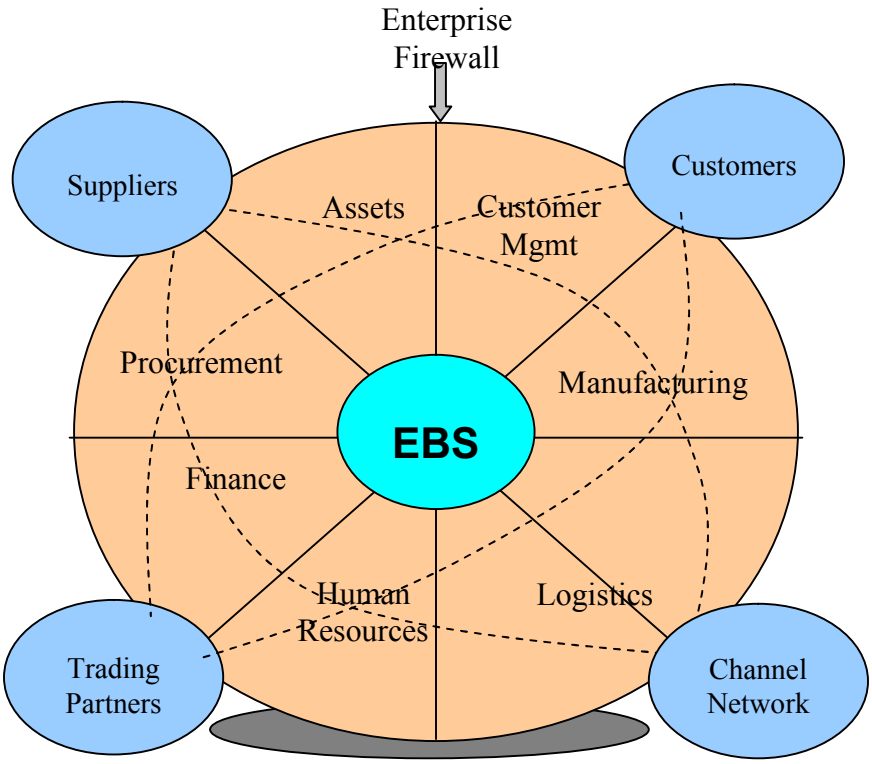

Figure 4 Basic Business Universe

Source: Author

8 Electronic Data Interchange (EDI)

The first major technology breakthrough providing garment companies to link with other companies was EDI. Despite the recent rise in internet-enabled data transmission capabilities. EDI constitutes today's most widely used method of supply chain connectivity. EDI provides for the computer-to-computer exchange of business transactions, such as customer orders, invoices, and shipping notices. EDI is an extranet system and consists of a set of transactions driven by a mutually agreed upon and implemented set of data transfer standards usually transmitted via private value-added networks (VANs). The critical importance of EDI is that the transacting garment companies can be using EBSs that run on different software systems and hardware. The EDI standards act as a "translator" that utilizes the agreed-upon transmission protocols to take the data residing in the computer format of the sending company and convert it into the data format used by the business system of the receiving company.

There are essentially two forms of EDI data transfer observed in the industry.

8.1 Computer to Computer: This method enables the computer system of one company to "talk to" the computer of a trading partner and transfer agreed-upon documents, such as purchase orders or payments, directly into each other's databases. Large-scale organizations like Madura Garments, Gokuldas and Aravind mills are using this kind of EDI technologies.

8.2 Third-Party Linkage: In this method, a third party indirectly links trading partners. This technique enables a single company's computer to interface with multiple supplier computers in any format, with any communications protocol. The third party performs the interfacing tasks for a fee. Most of garment companies of the study region have outsourced for third party to share the information across supply chain partners. As is the case with the implementation of any information technology tool, the ultimate value of an EDI system is only as good as the implementation effort and the ability of the channel information nodes to adapt to new organizational structures and values provided by the sharing of data throughout the channel network. The various benefits of EDI are as follows

8.3 Increased Communications and Networking: By enabling channel partners to transmit and receive up-to-date information regarding network business processes electronically, the entire supply chain can begin to leverage the productivities to be found in information networking.

8.4 Streamlining Business Transactions: By eliminating paperwork and maintenance redundancies, EDI can significantly shrink cycle times in a wide spectrum of transaction processing activities.

8.5 Increased Accuracy: Because transactions are transferred directly from computer to computer, the errors that normally occur as data is manually transferred from business to business are virtually eliminated.

8.6 Reduction in Channel Information Processing: EDI provides for the removal of duplication of effort and the accelerating of information flows that can significantly reduce time and cost between supply channel partners.

8.7 Increased Response: EDI enables channel members to shrink processing times for customer and supplier orders and to provide for timely information that can be used to update planning schedules throughout the channel.

8.8 Increased Competitive Advantage: EDI enables the entire supply network to shrink pipeline inventories, reduce capital expenditure, improve return on investment, and actualize continuous improvements in customer service.

While providing an effective method to perform data exchange between businesses, there are a number of drawbacks to EDI. To begin with, EDI is expensive and time consuming to implement. Garment companies must either agree on or use a recognized standard, often a daunting task in itself. Next, garment companies must shoulder the initial costs of purchase and implementation for VANs and translation/mapping software, and then begin the process of data mapping and architecture design. Once the EDI structure has been put in place, parties to the EDI system must shoulder the recurring costs of VAN bills, software maintenance on translators and mappers, and efforts of full- and part-time EDI workers across the organization. Depending on the depth and complexity of the undertaking, an EDI implementation can cost millions. Such obstacles

keep EDI centered on the transmission of relatively simple data packets, like the exchange of purchase orders and invoices. The cost and effort to develop EDI for more complex, strategic functions, such as customer relationship management, collaborative manufacturing, and buying exchanges, are simply beyond the financial and operation capacities of most organizations. In addition, there are other critical issues that directly impact EDI's capability to support the real-time processing of information needed by today's collaborative supply chains. The basic data elements of the EDI transaction are centered on transmitting whole packets of information that must be sent, translated, and then received through trading partner systems. The time it takes, often several days for processing, militates against the real-time flow of information and decision-making necessary for today's business environments. Furthermore, the proprietary nature and cost of EDI renders it a poor supply chain enabler. EDI is focused on eliminating operational costs that, by their very nature, have a law of diminishing returns. To be effective, EDI technology needs to enable the generation of data that could be used for strategic planning. Gaining such a perspective, however, requires that every member of the supply chain participation. In the present study it is found that only 25 per cent of the respondent organizations are using Electronic Data Interchange (EDI) through Value Added Networks (VAN) and Internet based EDI and they are sharing information through this dedicated network**.** This is again less because of the reason EDI requires huge investment and not compatible for internal and external collaboration and for every single order it minimally requires seven transactions such as Request For Quote (RFQ), Response to RFQ, Purchase Order and other functional acknowledgement.

Technologically savvy garment companies began to explore the use of a new computerized tool that held out the potential to drastically alter forever the way firms fundamentally advertised their products and conducted business. That tool was the Internet. Fueled by the explosion in PC ownership, advancements in communications capabilities, and the shrinking cost of computer hardware and software, garment companies became aware that a new medium for exchange was dawning, a new medium that would sweep away the traditional channels governing the flow of products and information, in favour of a way of interacting with the customer that had not been seen since the days of the general store, personalized, one-to-one marketing, buying, and selling relationships between individual suppliers and consumers. Web-enabled e-business can be said to consist of four definite phases, as portrayed in Figure 3.4.

9 Web Forms Technologies

9.1 I-Marketing: Throughout history, businesses have been faced with the fundamental problem of identifying effective mediums to provide the marketplace with information about their identities and their product and service offerings. In the direct marketplace, the producer presents physically to perspective buyers available goods and services. Everything depends on the closeness of availability and the personal relationship existing between buyer and seller at the moment of exchange.

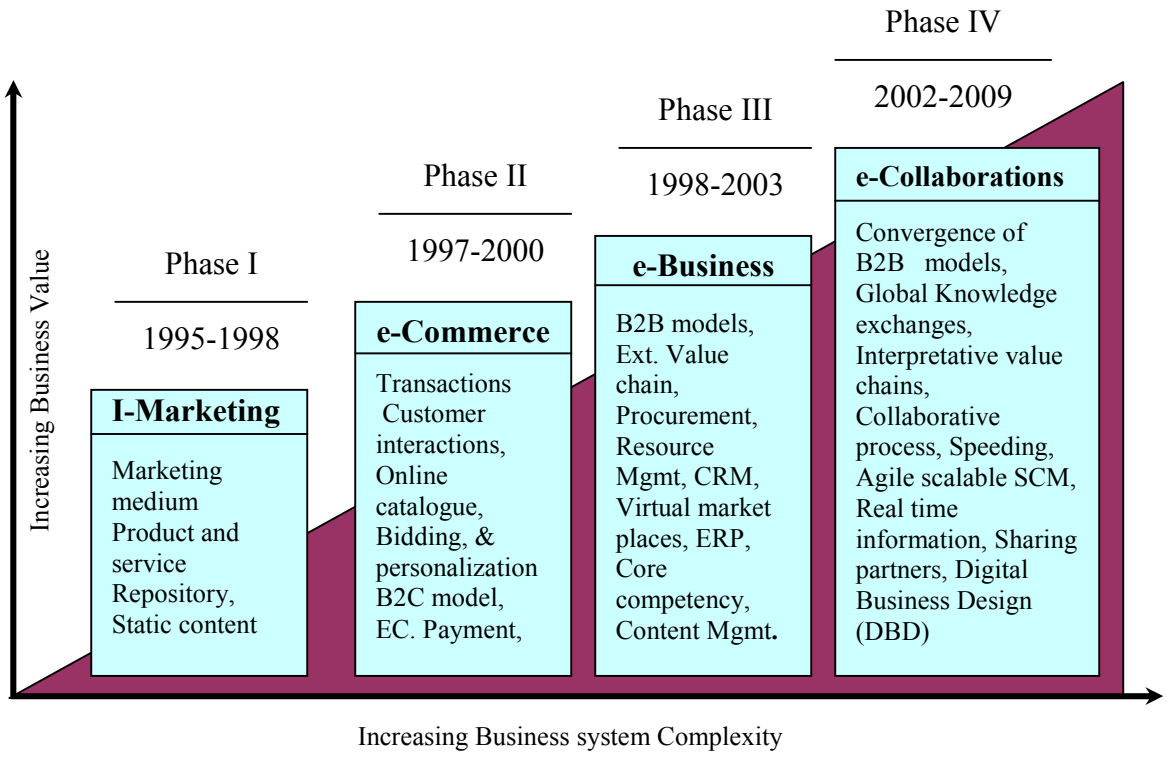

Figure 5 Four Phases of Web Enabled e-Business

Source: Author

However, as businesses move beyond the physical marketplace, they are immediately confronted with the problem of how potential customers, separated by space and time, can find out about the company and its range of goods and services. In the past, firms attempted to solve this problem by utilizing marketing tools such as advertising, printed matter, such as catalogs and brochures, trade shows, industry aggregation registers, promotions and pricing, and direct sales force contact. The goal was to reach a marketplace with a matrix of information enablers that would act as a substitute for direct face-to-face product and service selection and exchange.

Despite the sophistication of the traditional techniques, there were a number of problems with the approaches. To begin with, by their very nature, space and time fragment markets. The ability to inform and communicate with customers, both beyond local markets and across vertical and horizontal industries, was a challenge traditional marketer never really solved. Mass media advertising, direct marketing, and a host of other methods resulted in silo customer segmentation and hit-or-miss approaches that attempted to provoke a wide band of prospect interest or inform the existing client base. Second, the traditional marketing approaches represented a basically passive approach on the part of customers to search for and learn about new garment companies and their product/service mixes. Buyers tended to avoid the difficult task of sourcing and comparison in favor of purchasing based on branding and proven personal relationships.

In addition, information about new products (apparels) or changes to existing company offerings was hard to communicate to the market without considerable expense, and even then the message often missed its mark. Furthermore, garment companies also had very limited ways of communicating promotional and pricing initiatives that could impact marketplace behavior, also, because the content of traditional marketing was often limited by time and space, printed documentation, automation, and even language, globalization was rendered almost impossible. Firms focused their energies on supporting existing market positions, preferring to keep international initiates in the background. And finally, even heavily branded firms like Gokaldas and Raymond's lacked the means to communicate with their customers concerning fundamental changes' to business philosophies, goals, and strategies for the marketplace. The advent of the Internet and the World Wide Web enabled garment companies to finally escape from the limitations of traditional marketing, by providing a revolutionary medium to communicate to customers, not only regionally and nationally, but also anywhere, at anytime, around the world. Originating as a communications tool designed to network scientific and academic information, the Web became a key medium for marketing that provided both domestic and global garment companies with a low-cost medium to convey product and service information. The use of the Web to market products and services was nothing short of explosive. In the present study it is found that during 2008, 93 per cent of selected sample garment companies are using internet and had established a Website. Today it would be difficult to find a corporation that does not have a Website informing browsers about information ranging from company goals to detail product categories. The first phase of e-business has been termed Internet Marketing (I-Marketing). Because it is almost exclusively limited to the presentation of documentation about garment companies and their products and services, utilizing relatively simple Web-based multimedia functions. Customer use of I-Marketing browsing is essentially restricted to searching, viewing graphical presentations, and reading static text. I-Marketing Websites actually are little more than on-line repositories of information and are often termed 'brochure ware" because of their similarity to traditional catalogues and other printed product/service publications. Due to their limited functional architectures and business purpose, I-Marketing web sites do not provide for the entry of transactions or the ability of garment companies to interact with existing customers or prospects using the site.

Despite the deficiencies, the use of I-Marketing signaled an order of magnitude departure from traditional marketing techniques. To begin with, the ubiquitous use of the Web meant that garment companies were no longer circumscribed by time and space. A firm's mix of products and services could be accessed by anyone, anytime, anywhere on earth. This meant that all enterprises across the globe, both large and small, now had a level playing field when it came to advertising their businesses, their products, and their services. I-Marketing also changed dramatically the role of the customer who moved from a passive recipient of marketing information to an active participant in the search for suppliers that best matched a potential matrix of product, pricing, promotional, and collaborative criteria. Finally, I-Marketing enabled garment companies to aggregate marketing data from multiple vendors into a common catalogue, thereby creating an early version of electronically linked communities of buyers and sellers.

9.2 E-Commerce Storefront: While I-Marketing did provide garment companies with the capability to open exciting new channels of communication with the marketplace, technologically savvy executives soon realized that what was really needed was a way to perform transactions and permit interactions between themselves and the consumer over the Internet. A new kind of internet capability and a new kind of business model, the pure-play internet storefront designed specifically to sell and service the marketplace on-line, emerged. Soon companies like Amazon.com, e-Bay, and Priceline.com were offering Web-based storefronts that combined I-Marketing on-line catalogues and advertising techniques with new technology tools such as Web-site personalization, self-service, interactive shopping carts, bid boards, credit card payment, and on-line communities that permitted actual on-line shopping. The new e-business storefronts spawned a whole new set of e-application categories and included the following

9.3 E-Tailing and Consumer Portals: These are the sites today's internet shopper normally associates with web-based storefront commerce. The overall object of enterprises in this category is to enable web-driven fixed-price transactions, centered on products and services aggregated into catalogues and sold to aggregated groups of consumers.

9.4 Bidding and Auctioning: Sites in this category perform two possible functions. Some sell products and services through auction-type bidding using bid boards, catalogue integration, and chat rooms. Others, like eBay, ONSALE, and uBid perform the role of third-party cyber mediaries who, for a service price, match buyers and sellers.

9.5 Consumer Care/Customer Management: These applications provide a wide range of customer support processes and functions focused on enabling a close relationship-building experience with the consumer. These applications include customer profile management, custom content delivery, account management, information gathering, and interactive community building.

9.6 Electronic Bill Payment (EBP): These applications assist customers to maintain accounts and pay bills electronically. For example, large garment companies such as Benetton have made conscious efforts to move their billing on-line, while a number of smaller EBP dot-coms have surfaced on the Web devoted to bill aggregating, payment, and personal finance management. Typical EBP features include Internet banking, bill consolidation, payment processing, analysis, reporting, and integration with biller accounting systems. For many in both the marketplace and the investment community, this new brand of electronic business-to-consumer enterprise seemed to offer a path to a whole new way of selling and servicing in what was being termed the 'new economy." The advantages of the e-business storefront over traditional stores were obvious. A single seller could construct a web storefront that could reach a global audience that was open for business every day of the year, at any hour. By aggregating goods and deploying web-based tools, this new brand of marketer could offer customers a dramatically new shopping experience that combined the case of shopping via personal PC with nearness, capability for self-service, access to a potentially enormous repository of products and services, and information far beyond the capacities of traditional business models.

The goal of storefront e-commerce is nothing less than the reengineering of the traditional transaction process by gathering and deploying all necessary resources to ensure that the customer receives a complete solution to their needs and an unparalleled buying experience that not only reduces the time and waste involved in the transaction process, but also generates communities-of-interest and full service consumer processes, take for instance Amazon.com., whose goal is not just to sell products, but to create a shopping "brand" where customers can log-on to shop for literally anything. In such a culture, the real value of the business is found in owning the biggest customer base that contains not only their names and addresses but also their buying behaviors, opinions, and desires to participate in communities of like consumers.

9.7 E-Business Marketplaces: In contrast, e-Business Marketplaces resemble traditional business purchasing it is often a long-term, symbiotic, and relationship-based activity where collaboration between stakeholders directed at gain sharing is critical. e-Business Marketplaces can be divided into three separate types. The selection of a type depends on the overall strategy of the business and how it wants to compete in the marketplace.

9.8 Independent Trading Exchanges (ITXs): ITXs can be defined as many-to-many marketplace, composed of buyers and sellers networked through an independent intermediary Figure 6. Successful ITXs today operate in industry marketplaces that are highly fragmented and have a considerable level of product or service complexity. In this context, complexity is defined as requirements for special user needs, time-sensitive products, geographical limitations, volatile market conditions, and non-standardized manufacturing or channel delivery processes.

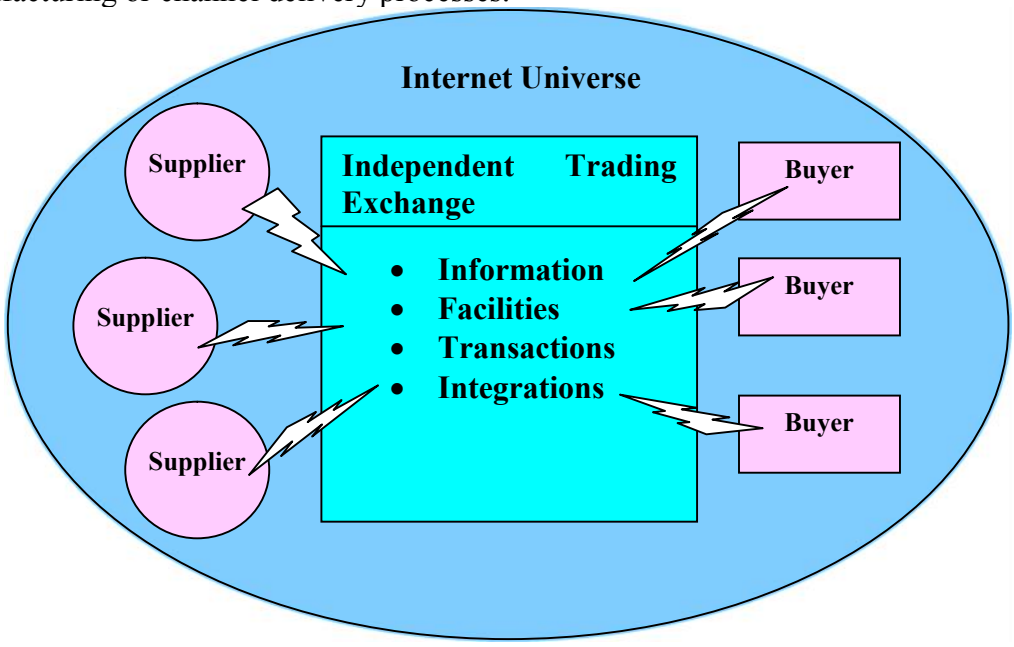

Figure 6 Independent Trading Exchange Model

Source: Author

ITXs can essentially be divided into two types. The first, independent vertical exchanges, attempt to facilitate trade in order to make a vertical industry more efficient.

ITXs in this group address industry-specific issues and provide industry-specific applications, services, and expertise without significant investment from existing industry players. The second type of ITX has been termed independent horizontal exchanges. ITXs in this group facilitate procurement economies, products, and services to support business process that are common across multiple industries. ITXs are primarily used for managing spot buys, disposing of excess and obsolete inventory, and procuring non-critical goods and services[4].

ITXs are operated by a neutral third party, which utilizes strong industry and domain expertise to manage relationships and vertical-specific processes. Their business plan is remarkably simple. ITXs offer a neutral site where purchasers and suppliers can buy and sell goods and services. In turn, the ITX operators collect user fees, or transaction commissions for their web development, promotion, and maintenance efforts. According to AMR Research.[5] ITXs provide four major levels of functionality.

9.9 Information: Perhaps the major function of ITXs is their ability to provide special assistance to industry verticals by leveraging a high level of industry expertise and information in the form of specialized industry directories, product databases and catalogs, discussion forms and billboards, and professional development.

9.10 Facilitation: On this level, ITXs facilitate the matching of specific needs of buyers with the capabilities of suppliers, typically through an auction or chat room. The actual transaction is normally completed offline.

9.11 Transaction: Besides matching buyers and sellers, ITXs on this level can conduct the transaction on-line. The ITX often takes title of the goods and corresponding responsibility for accounts payable and receivable. Besides pricing and terms management, the ITX can also provide shipping and order status information.

9.12 Integration: On the highest level. ITXs provide integration functionality permitting trading exchange services to (it into a larger supply chain and application integration strategy. ITX services greatly increase their value to garment companies if they can help leverage investment in installed applications and established relationships. As the dot-com craze swept through business at the beginning of 2000. Industry analysts predicted that independent e-marketplaces would be the wave of the future. Almost every narrowly defined vertical market had one or more B2B sites to call its own. By mid-2001, however, the bottom had fallen out of the ITX marketplace, as sites ran out of money before they could attract enough participants or, recognizing there were too many sites chasing the same industries, merged with stronger competitors. Beginning in 2002, ITXs are expected to see modest growth. AMR projects that ITXs will become progressively more specialized in function, as well as focused on a vertical marketplace. In addition, garment companies will increasingly view ITXs as a complement to the horizontal

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[4] See the comments in Latham, Scott, "The New Internet Intermediary," Supply Chain Management Review, 4, 2. 2000, 25 and Starr, C. Edwin, Whitaker, Jonathan D., and Stephens, Jay A., "Which Independent Trading Exchanges Will Remain Standing?," Supply Chain Management Review Global Supplement, January/February 2001. 4-7.

[5] Harbin, Joan, and The 2001 AMR Research Survey: Top Trading Exchange Services for Industry Verticals, AMR Research, May 2001. 8.

approach of private exchanges. Survivors can be expected to follow live strategies ally with consortia players, merge with or acquire traditional businesses, provide specialty capabilities, serve niche marketplaces, or merge with other independent trading exchanges.

9.13 Private Trading Exchanges (PTXs): The trouble with the ITX craze of 2000 was that they were "hyped" to satisfy expectations that they were never designed to fulfill. Garment companies soon realized that their initial step into the e-marketplace was first, to leverage Web-based tools to define unique opportunities for improving their own internal value chain performance and, secondly, to create similar integrated networks with their trading partners. ITXs provided simple buy-and-sell capabilities. What many garment companies realized is that what they really wanted from their B2B e-marketplace was not only ease of doing business, but also one-to-one collaborative capabilities with network partners, total visibility throughout the supply chain, seamless integration of applications, and tight security. By mid-2001, many garment companies interested in Web-driven marketplaces were creating private exchanges. The objective was to form an enterprise's internal business units and preferred business partners into a closed e-marketplace community linked by a single point of contact, coordination and control. Such a strategy required the establishment of what has become known as a PTX. A PTX can be defined as a Web-based trading community hosted by a single company that requires or recommends trading partners, usually suppliers, participate in as a condition of doing business. Often a large market-dominant company that seeks to facilitate transactions and cut costs while also cementing the loyalties of their own customers and suppliers drives this type of e-marketplace. Figure 7 provides an illustration of the PTX concept. According to Accenture.[6] The decision to construct a PTX is based on three fundamental criteria.

[6] Dik, Roger W. and Whitaker, Jonathan D., "The Power of Private Exchanges." Supply Chain e-Business, 2. 4. 2001, 44 and Whitaker. Jonathan D. Whitaker, Murphy. Matthew D., Halt/el, Andy II., and Dik. Roger W., "Private Exchanges: The Smart Path to Collaboration." Supply Chain Management Review Global Supplement. July/August, 2001,8-11.

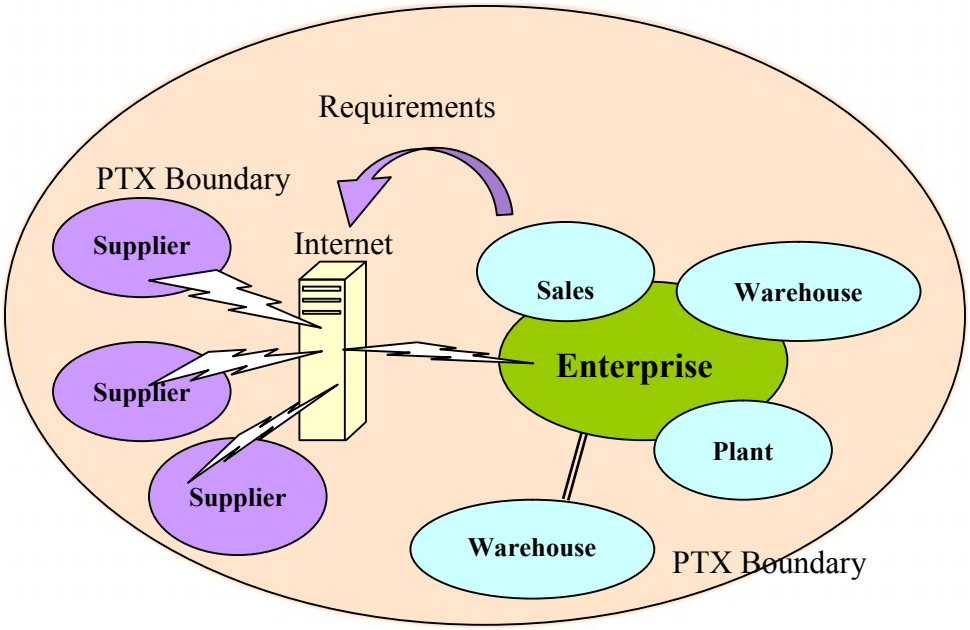

Figure 7 Private Trading Exchange Model

Source: Author

9.14 Garment companies with exclusive products, processes, or market position. Firms with proprietary product/service offerings often feel that a PTX would allow them to use e-business tools, while avoiding ITX comparison shoppers as well as protect the product's unique value and brand. For example Madura garments and Aravind mills have implemented PTX.

9.15 Garment companies possessing special process capabilities. Businesses possessing special processing competencies in areas such as customization or flexible manufacturing are excellent candidates for a PTX.

9.16 Garment companies with dominant market position. PTXs are a logical choice for garment companies whose products hold a dominant position in the market. PTXs may also be the choice of garment companies that have little to benefit from the aggregation capabilities of an ITX or Consortium. Companies like Raymonds and Benetton have little to gain, and a lot to lose, in an open trading exchange. Beside product, process, and market reasons, garment companies may choose a PTX over an ITX or a Consortium for other reasons. To begin with, a PTX provides garment companies with enhanced privacy and security regarding exchange pricing and volumes. Second, a PTX facilitates linkages across exchange partner EBS and SCM systems that can assist in passing information regarding inventory and capacity statuses. Next, unlike most ITXs, which focus either on the customer or the supplier side, a PTX enables garment companies to build e-business capabilities on both sides simultaneously. Fourth, a PTX offers firms the ability to move beyond mere transaction management and build network collaborative capabilities in such areas as inventory management and planning, product design, production planning and scheduling, and logistics. Finally, because PTXs help build among channel partners a sense of collaboration and trust; they can extend a greater level of competitive advantage than can participants in an open exchange. A PTX

provides a range of other services as well. According to an AMR report[7]. Today's PTX provides the following key services:

Identity Management: PTXs provide the ability for internal and external customers to establish and manage the identity of the transaction mediums and people executing the exchange.

Content Management: PTX content ranges from relatively static functions, such as catalogs and service capabilities, to dynamic functions, such as pricing or product availability, to interactive functions, such as purchase order. Content management can also consist of unstructured content, such as multimedia and business rules. Functionality must include the ability to define and manage exchange content schemas and descriptions.

Integration: An effective PTX must be fully integrated with the enterprise EBS back-office functions of trading partners. As this integration deepens, synchronization and collaboration with supply chain partners becomes more robust.

Process Management: Effective PTXs must have functions including dynamic pricing, negotiation, returns, promotion management, or other collaborative applications.

Analytics: Warehousing the vast amounts of data generated by PTX transactions is critical. Analysis of such data enables measurement of the effectiveness of the supply network relationships enabled by the PTX.

9.17 Consortia Trading Exchanges (CTX): As the ITX craze began to fizzle in 2000, another form of exchange, the industry consortium, began to emerge. A CTX can be defined as a some-to-many network consisting of a few powerful garment companies organized into a consortium and their trading partners. For the most part, very large corporations in highly competitive industries such as textile garment CTXs being formed. The goal of a CTX is simple to combine purchasing power and supply chains in an effort to facilitate the exchange of a wide range of common products and services through the use of Web-based tools, such as aggregation and auction, between vertically organized suppliers and a few large garment companies. The CTX model can be seen in Figure 8. Functionally, CTXs utilize elements of both private and independent exchanges. Similar to a PTX, a CTX offers the critical elements of control over membership, security, and most importantly, the ability to build and maintain collaborative capabilities. On the other hand, CTXs also enable opportunities for individual members to access each other's trading partners. In addition, consortia e-markets may allow other garment companies to join the exchange, providing the CTX with an expanding number of members.

There are a number of significant drawbacks to establishing a CTX. To begin with, the ability to weld a number of competing super-enterprises and their supply chains

[7] Parker, Bob, "Enterprise Commerce Management: The Blueprint for the Next Generation of Enterprise Systems," AMR Research, June, 2001. 14.

into a single consortium is filled with difficulties. Competitive pressures, technology selection, software selection and integration issues, and possible antitrust interference from the government all militate against successful CTX formation.

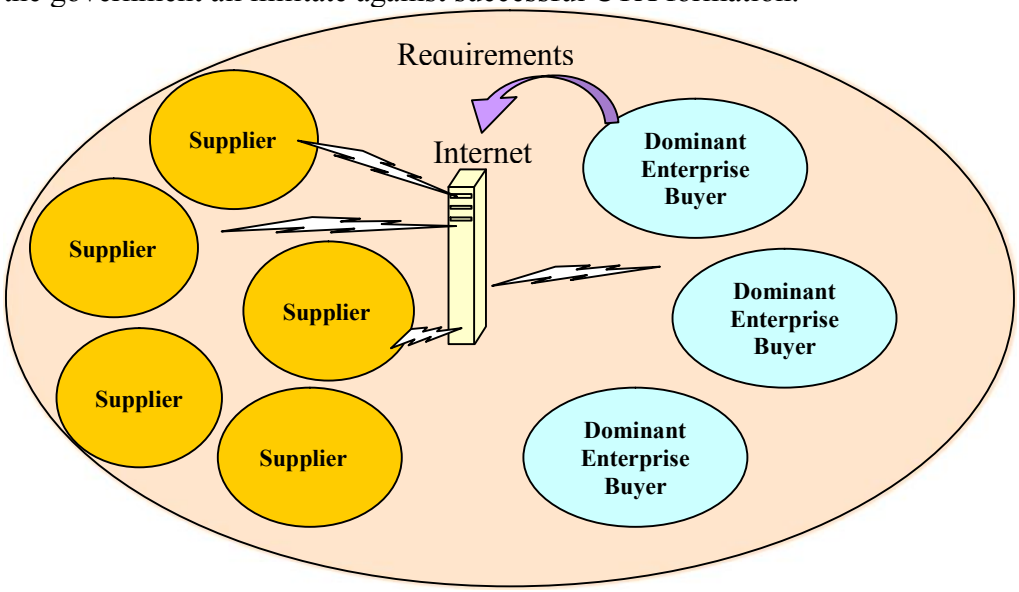

Figure 8: Consortium Trading Exchange Model

Source: Author

Of these drawbacks, a major one is the Internet architecture of a CTX requiring consortia members to standardize processes and utilize a common e-business language. The need to establish a common platform can be a sticky negotiating point. In addition, although internet companies such as Commerce-One provide packaged solutions, the establishment of a CTX is an expensive affair and regardless of the software vendors selected, must often be built from the ground up or heavily customized. While CTXs hold out the promise for decreasing costs, speeding time-to-market, and fostering collaboration, there are many hurdles to climb. Internally, CTXs are grappling with technology issues such as standardization, integration, and deploying collaborative technologies. Externally, there is the daunting task of signing up members. Without liquidity, even the best-conceived CTX is doomed. Part of the problem is getting members up to speed technologically to participate in the exchange. Perhaps of greater importance is convincing suppliers that participation would be worth their efforts. Establishing a site governing body that is also seen as impartial, fears that CTXs will simply serve as an arena where the lowest price will win regardless of quality, and apprehension about data security all are critical issues that must be solved before a consortium can truly realize its potential.

9.18 Collaboration Marketplaces: The power of e-business marketplaces to increase demand visibility, operational efficiencies, and customer segmentation, while simultaneously decreasing procurement costs, replenishment time, and geographical barriers has dramatically changed the nature of supply chain management. But, while all types of businesses in all types of industries have been able to utilize e-business technologies to gain significant benefits, it is evident that B2B e-marketplaces are

actually in their infancy rather than mature tools for the kind of value chain management they will be capable of in the near future. As they evolve from transaction based to supply chain collaborative and synchronized systems, a variety of business management and technology changes must occur. To date, the attempts of garment companies have made to leverage B2B marketplace technologies have been largely focused on improving business with the channel partner found on the next network tier. These one-to-one relationships, as illustrated in Figure 8, consist of linear handoffs of goods and information from a company to the immediate supply partner, such as supplier-manufacturer or distributor-retailer. The chained pairs of relationships model, while facilitated by the power of the internet, nevertheless, is incapable of responding to the value chain needs of groups or tiers of business relationships, because their interfaces limit interoperability, and their rigid architectures inhibit the synchronization of data from multiple sources. The capabilities of the internet have made real-time collaboration between supply chain partners possible. Termed collaborative commerce (c-commerce), the concept seeks to extend the enabling power of business relationships beyond transaction management to true collaboration across a network of channel allies. The goal of c-commerce is to extend the capabilities of the Internet to enable tools that provide for greater supply chain visibility and connectivity. As illustrated in Figure 9. These tools can be divided into three regions. The first, Basic B2B Commerce, consists of application tools that provide marketing information and transaction functions via the Web.

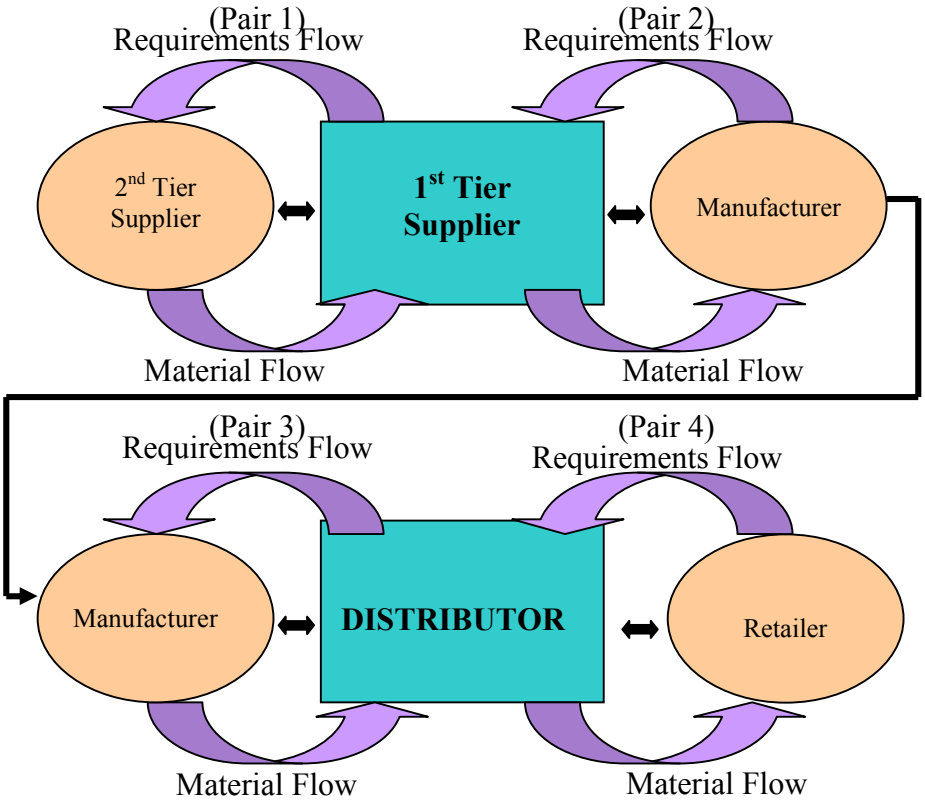

Figure 9 Value Chain Trading Pairs

Source: Author.

While enabling garment companies to tap into the power of Internet-based commerce, these applications tools provide firms with tactical competitive advantage. The second region, supply chain management, seeks to develop the collaborative aspects of internet technologies to better manage networked customers and inventories. Briefly, applications at this level can be described as follows.

Collaborative Channel Management: These tools focus on two e-market objectives to move beyond a marketing strategy that focuses purely on customer segmentation to one that can provide appropriate levels of services to customers with different value, and to construct internet empowered logistics systems that link supplier selection and transportation visibility with company customer service functions.

9.20 Collaborative Inventory Management: The ability to provide inventory visibility beyond chained network pairs is critical to removing the obstacles blocking effective channel inventory management. As changes occur either upstream or downstream in the value chain, dynamic collaboration will enable network partners to react immediately to ensure customer service while guarding against excess inventories. The final and most sophisticated of the c-commerce regions is Value Chain Collaboration. Applications in this area seek to leverage the full value of real-time collaborative solutions.

9.21 Collaborative Forecasting and Replenishment: Broadcasting demand requirements in real time across the channel network are one of the fundamental objectives of B2B e-marketplaces. Collaborative demand planning enables garment companies to escape from the restrictions of chains of paired channel relationships that conceal real network requirements and capability-to-promise.

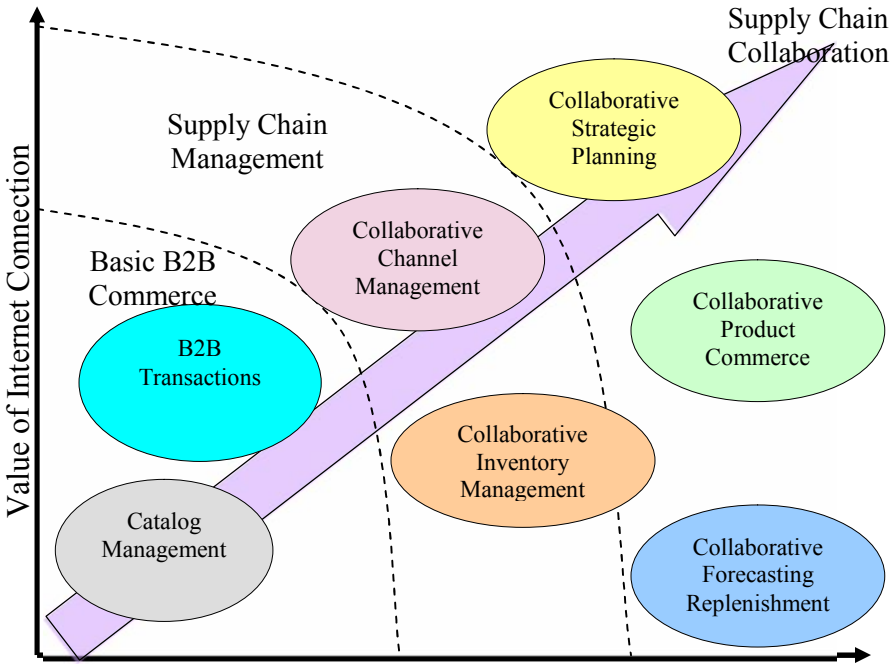

Figure 10 Regions of B2B Collaborative e-Market place

Source: Author

9.22 Collaborative Product Commerce (CPC): The needs of product outsourcing, shrinking time-to-market product development cycles and requirements for increasingly agile manufacturing functions have necessitated that product design and engineering utilize a collaborative approach. CPC is defined as the deployment of cross-channel teams of developers and engineers who are responsible for garments or apparel of the overall design. Utilizing Internet tools to provide for information sharing and transactions, the goal is to collectively manage apparel content, sourcing, and communications between product OEMs, suppliers, and customers to eliminate redundancy, costs and time from the product development process.

9.23 Collaborative Strategic Planning: Perhaps the prime objective of c-commerce is the establishment of collaborative e-marketplaces, not only to redesign business and support processes that cross company boundaries, but also provide for a new vision of the strategic role of the supply value chain. garment companies engaged in a c-commerce marketplace will be able to harness Internet technologies to create virtual corporations, brought about by any-to-any connections of value-added processes from anywhere in the supply chain system, capable of creating immense repositories of competitive advantage. The value web produced by B2B collaborative marketplaces represents a dramatic departure from current views of the value chain. The goal is to deconstruct the chains of network pairs and reassemble the disconnected amalgam of network business processes into webs of customer-focused suppliers, manufacturers, and distributors. Traditional supply chains are linear where monolithic systems, like EDI, govern sets of complex business processes. Such systems are difficult to build and expensive to maintain.

Furthermore, they do not provide connectivity to capabilities and competencies beyond the members hard-linked into the network.

Internet collaborative marketplace process webs provide any-to-any connections that can drive procurement webs, manufacturing webs, and even linked business strategies. Systems must be robust enough to service a single trading partner and agile enough to evoke worm-holes in the fabric of the possible supply universe in the search of any-to-any virtual supply sources capable of linking and unlinking resources in support of critical business processes. The capacity to access possible resource worm-holes and manage and optimize business process webs requires increased technical capabilities. The ability to process transactions and information is only one of the basics of what the internet can offer to supply chains. Ultimately, the objective is for garment companies to share their planning systems and core competencies directly wherever they are on the globe. Technology application providers offering integration/collaboration application services that enable trading partners to limit investment in developing, maintaining, and supporting complex environments required to work with numerous garment companies across various networks.

The efforts at e-marketplace collaboration are perhaps the most aggressive. Predecessor e-business efforts on the other hand projects that their collaboration tools will be the greatest benefit offered by the exchange. In terms of collaborative demand planning, the CTX will permit to escape from the existent linear value chain network. For example, if garment manufacturer changed the volume of production, the components requirements would proceed serially down through each supply tier, often taking weeks, obscuring the actual state of demand, and resulting in safety inventories at each channel tier. With e-marketplace collaboration, changes in demand can be broadcast to all members of the value chain simultaneously, providing the demand visibility and synchronization that will increase serviceability and cut "just-in-case" inventories in garment industry. Even more critical to garment manufacturer is the potential for collaborative design. The goal is to bring design engineers together by connecting over the Web, in real time, tools such as CAD, to design wear, pass plans back and forth, update them, get quotes generated and components ordered, and follow the timetable to their deliverability. For example, designs for collar or sleeve, pockets, can be put through e- market place portals. Thus the cycle time will be reduced to just a few days.

While the recession and tragic events of many dramatically slowed down the implementation of c-commerce and SCM application suites in 2008-09, these tools continue to be seen as tomorrow's sources of competitive advantage. While it is true that there was a lot of hype, a lot of promises that could not be fulfilled, a lot of misunderstanding about costs and the level of commitment involved, and a lot of confusion about how to effectively use the range of e-market tools available, there was also evident a lot of benefits that garment companies were taking to the bottom line. The range of benefits extends from:

a. **Increased market supply and demand visibility**: enabling more customer choice, potentially better fit of products to buyers and a larger market for sellers.

b. **Price benefits from increased competition**: auctions and e-markets can be used to increase price competition and lead to dramatically lower procurement costs for buyers.

c. **Increased operational efficiencies**: through improved procurement, order processing, and selling processes. Efficiencies can also include faster order cycle times.

d. **Improved partner and customer segmentation**: e-market platforms can be used to transform customer segmentation and provide appropriate levels of services to customers with different value.

e. **Improved value chain collaboration**: e-market platforms will enable buyers and sellers to work together collaboratively for product designs, planning, introduction, marketing campaigns, and life-cycle management programs.

f. **Synchronized supply chains:** where visibility into operating information across the value chain allows garment companies to drive efficiencies across the entire value chain. These include increased inventory turnover, fast new product introductions, lower WIP inventories, and others.

Without a doubt, the requirements for cost management and work how efficiencies on the tactical and collaborative functions on the strategic side will continue to propel the development of various forms of e-business markets. While the technical capabilities of e-marketplaces today limit the range of strategic collaboration, expect future e-markets to possess broader functionality. Not all will have the same capabilities. Expect ITXs to continue to move toward product and service niches. The power of CTXs can expect to grow as standardization and e-business tools become cheaper to acquire and integrate together. Likewise, PTXs can also be expected to increase their focus on direct material procurement and deep collaboration with trading partners and will most likely have the most sophisticated systems. Finally, it is expected that tomorrow's enterprise will participate in a portfolio of trading exchanges, selecting e-market exchanges that possess market dominance or unique capabilities that service a particular business requirement.

Conclusion: The rise of SCM as perhaps today's most potent mechanism for competitive advantage has been enabled by the dramatic breakthrough in information and communications technologies occurring over the past ten years. By its very nature SCM is a cross-enterprise management process requiring network partners to synchronize information transfer and business processes and provide close collaboration on everything from

planning to transaction management. In the past, however, homegrown MRP II and ERP-type solutions looked inward. While such systems offered garment companies the possibility to continuously improve internal processes and performance, their architectures blocked them from connecting with trading partners outside the walls of the enterprise. Although tools like EDI provide electronic linkages, they are expensive and cumbersome, forcing small scale garment companies to depend on manual data transmission and formal or implied contracts outside the enterprise system to manage the supply chain.

Sometime in the mid-2000s, India's garment companies began to harness the power of the internet to overcome the limitations in their EBSs. By utilizing Web-based applications that could be made available to anyone, anywhere, at a very low threshold of cost and effort, the connectivity necessary to drive true SCM integration became possible for the first time. Web-enabled businesses could utilize four distinct, yet fully compatible regions of e-business to manage their supply chains. Through Internet-Marketing, garment companies could leverage the ubiquitous use of the Web to transcend the limitations of tradition marketing and reach out to any customer, anytime, anywhere on earth through e-Commerce Storefronts, garment companies could perform transactions and permit interactions between themselves and the customer over the Internet. e-Application categories, like consumer portals, bidding and auctioning, customer management, e-services and electronic bill payment not only pointed to radically new ways of doing business but seemed so revolutionary that they were seen as the drivers of a "new economy."

Mapping out the application and integration architecture of today's SCM business system is a daunting task. Applications such as CRM, SCM, APS. e-procurement and others have dramatically changed the configuration of yesterday's ERP while EBSs still serve as the "backbone" of enterprise business management, the emerging functionality of workflow and process management middleware is slowly decoupling former monolithic ERP business software suites and merging them with e-business applications.

While the promise of the internet seems to open up almost limitless possibilities, it is also filled with grave dangers for the unprepared. As the dot-com crisis of 2000-2001 demonstrated, even the most technically advanced enterprise needs to painstakingly prepare an effective e-business strategy and then be capable of executing the plan.

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