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 **(a) Origin of Supply Chain Management**

**A** business entity, in the earlier 1950s revolved more around its own self. Merger and acquisitions though prevalent ,a firm used to engage its resources for all the activities needed from buying raw materials to manufacturing and then distributing the products to stockiest,  dealers and retailers. The aim was to produce more, reduce cost, sell more and increase profit, all by oneself. Creating partnerships with upstream or downstream players was not considered. As a result, keeping large inventories on the shop floor to sustain mass production was considered necessary. However, as the competition grew in 1970s the need for cost reduction got greatly emphasized and soon there were efforts to reduce inventory.

Material requirement planning (MRP) and Manufacturing Resource planning (MRP II) systems were introduced to reduce inventory holding.

Need for effective Materials management was duly recognized. The advancement in Information Technology , witnessing application of complicated softwares for tracking and managing inventories through LAN and WAN became competitive factors. Concepts such as JIT and TQM helped the processing on the shop floor. The origin of supply chain management can be traced to 80s.

The 80s, saw a dramatic change in the business scenario all over the world due to globalization and liberalization.

Low cost ,high quality product and customer delight became the buzz words for the industry. Increased dependence on JIT and TQM methodologies created the vision for strategic partnerships.

Development in IT further reduced the national boundary concepts. The first mention of the term supply chain management was found in a paper published in 1982 in the US.

Market globalization also presented a great opportunity to reach out to high potential global markets.

This needed relook of the way inventory and logistics were being done.

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The challenges associated with enhancement in quality, manufacturing efficiency, customer service and new product design and development also increased.

To deal with these challenges, manufacturers began buying from a select number of certified, high quality suppliers with excellent service reputations and involved these suppliers in their new product design and development activities as well as in cost, quality and service improvement initiatives.

Obviously, supplier management and customer management became focused activities for a firm and Supply Chain Management became popular as a source of competitive advantage for the firms.

Today, Supply Chain Management has concretized for itself into :the purchasing and supply management emphasis from industrial buyers and

the transportation and logistics emphasis from the wholesalers and the retailers

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The new well talked about concepts are supply chain spanning from the supplier's supplier on the one hand to the customer's customer on the other hand. In the future, it is expected that supply chain management emphasis will concentrate on supply chain expansion, increasing supply chain responsiveness and further reducing supply chain costs.

**Definitions of Supply Chain Management - a clear scm concept clears the vision**

**S**upply Chain Management is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. What is Supply Chain Management then?

**The concept of Supply Chain Management is based on two core ideas:**

**“The first** is that practically every product that reaches an end user represents the **cumulative effort of multiple organizations**. These organizations are referred to collectively as the supply chain.**”

The second idea** is that while supply chains have existed for a long time, most organizations have only paid attention to what was happening within their “four walls.”

Few businesses understood, much less managed, the entire chain of activities that ultimately delivered products to the final customer. The result was disjointed and often ineffective supply chains.

"Supply chain management, then, is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible". Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.

**The Institute for Supply Management** describes supply chain management as"the design and management of seamless, value added processes across organizational boundaries to meet the real needs of the end customer. The development and integration of people and technologiescal resources are critical to successful supply chain integration".

“Supply Chain Management is the process of planning, implementing and controlling the operations of the supply chain with the purpose of satisfying the customer's requirement as efficiently as possible. Supply Chain spans all movement and storage of raw materials, Work-in-process, inventory and finished goods from the point of origin to the point of consumption.”

According to the CSCMP , a professional association, that developed the definition, "Supply Chain Management encompasses the planning and  management of all activities involved in sourcing and procurement, conversion and all logistics management activities. It also includes coordination and collaboration with channel partners which can be suppliers, intermediaries, third party service providers and customers. In essence, Supply chain management integrates supply and demand management within and across companies.**"**

“The Supply Chain Council defines it as "managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer".

The council of Logistics Management defines supply chain management as "the systemic, strategic coordination, of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain for the purpose of improving long-term performance of the individual companies and the supply chain as a whole"

**Maximizing the Growth of Business Organizations**

**W**hen we talk about the importance of Supply chain management we try to bring into sharp focus the loss due to the absence of an effective supply chain strategy and / or the benefit due to a well oiled supply chain for any firm. Basically, it is a question of how good is the integration of supply chain that matters for any firm.

Of critical importance in today's business scenario is managing competition through partners.

An independent firm on its own may not have all the resources to match its competitors. But by having an upstream and a downstream arrangement of getting the input , processing it into output and then pushing it to the downstream for distribution with effective chain partners it can face any business challenges.**Importance of having a robust Supply Chain Management** can be understood by an example:

ABC manufactures the cycle chains for a cycle manufacturing company XYZ. Another company PQR manufactures bits used in the cycle chain manufactured by ABC.
In coming days ,as per the market forecast, XYZ shall be needing 50,000 units of cycle chain ,an information that is not available with ABC. Accordingly, PQR also does not know how many bits to produce in order to meet ABC's requirement. The result would be either both ABC and PQR hold high safety stock inventory or lose business respectively with XYZ and ABC.

Now, if in this example showing only three supply chain partners , absence of a critical information among the partners, that is of production forecast at XYZ firm results into either a higher inventory level or loss of future business what would happen if the supply chain consisted of a large number of partners, a scenario normally existing for medium to large sized companies ,the world over ?

In an era of gaining competitive advantage through reduced inventories all over ,a company is going to have terrible disadvantage of having to carry unnecessary inventory for the fear of losing future business.

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The importance of Supply Chain Management thus is in :

\* Reduced inventories along the chain
\* Better information sharing among the partners
\* Planning being done in consultation rather than in isolation

The benefits too would be reflected in terms of :

* Lower costs
* Better customer service
* Efficient manufacturing
* Better trust among the partners leading to win-win process integration and other efforts result in improved quality as higher profit margins shall get reflected in creation of better facilities for manufacturing, product design research, enhanced customer service.

**Answer .1 (b) GENERIC TYPES OF SUPPLY CHAINS**

**A** Supply chain comprises “ three or more companies directly linked” a basic supply chain consists of “ a company, an immediate supplier, and an immediate customer”. Further, an extended supply chain includes “suppliers of the immediate supplier and customers of the immediate customer”, and an ultimate supply chain includes “all the companies involved in all the upstream and downstream flows… from the initial supplier to the ultimate customer”. We describe below a few types of supply chain, which are generic in nature and being implemented in real life situations along with their typical characteristics.

1. Arm’s Length, Open Competition
	1. Conventional setting, impersonal dealings.
	2. Competitive Bids, Tenders and Market Testing.
	3. Emphasize the Rigor and Tough Bargaining.
	4. Trust, mutual respect may not be present.
2. Commodity Trading
	1. Independent trading driven by the deal.
	2. Important intermediary (buyer) acting as an interface.
	3. Emphasize the need to manage volatility with commodities.
	4. High Volume of Purchase.
3. Partnering for customer delight
	1. Openness, Trust and Shared Deliverables.
	2. Emphasize on Performance Upstream and Value Downstream.
	3. Some degree of partnership at both the ends from the buyer’s point of view.
4. From Supplier’s supplier to customer’s customer
	1. Link up All the players in a Horizontal Supply Chain.
	2. Emphasize Seamless Delivery, Optimization and Integration.
	3. Emphasis on good degree of integration.
5. Lean Supply Chains and Systems Integration
	1. War on the Waste and Step Change Cost Transformation. With minimal or no bureaucratic procedures/rules.
	2. Emphasize Lean as in fat, not lean as in Starving.
	3. Streamline
6. Competing Constellations of linked companies
	1. First Movers link up with the best players.
	2. Emphasize Capability, Competence and cultural Compatibility.
	3. Competition based on value delivered to the customers.
	4. Good degree of interaction.
7. Interlocking network supply between competitors
	1. Link up for Incremental Business.
	2. Emphasize an Association where there is little Competitive Advantage.
	3. Limited combination of both competition and cooperation.
8. Asset control supply: dominate or die
	1. Gain Control of the assets and leverage them.
	2. Emphasize Staying the Right Side of Monopoly Abuse.
9. Virtual Supply: No Production, Only Customers
	1. Low Fixed Costs and Subcontract Production.
	2. Emphasize Marketing Skills and Superb Distribution.
	3. Good Degree of understanding of customers.
10. Basic single-stage supply chain

Customer

Orders

Supplier

Orders

Money

Information

Information processing

Material

Manufacture/Convert

Distribute

Deliver

* 1. Vital flows (material, information, and money) managed well.
	2. Good degree of connectivity.
1. Multistage Supply Chain

 Stage 1 Stage 2 Stage3

 (e.g. supplier) Manufacturer (e.g. retailer)

 Money

 Information

 Information Processing

 Material

* 1. Various Flows managed well
	2. Connects various entities for multistage, multi-product movement
	3. Important role of IT.
1. An example of Logistics supply chain.
	1. Transportation networks move goods among facilities;
	2. Material handling networks move goods within facilities.

**Manufacture**

**Manufacture**

**Manufacture**

**Warehouse**

**Warehouse**

**Warehouse**

**Assembly or Sub-assambly**

**Assembly**

**Supplier**

**Supplier**

*Materials*

*Materials*

*Components*

*Material Handling Network*

*Finished goods*

*Finished goods*

*Transportation Networks*

*Transportation Networks*

**Major Drivers of Supply Chain**

**M**ichael Hugos, a noted author and practitioner of SCM concepts, suggests that there is a basic pattern to the practice of SCM and the development of its measures. He suggests that the supply chain consists of five major business drivers. These drivers are

1. **Production-** This is typically related to issues on what to produce, how to produce (which manufacturing process) and when to produce.
2. **Inventory-**  Here the decisions and issues may be concerned with how much to make and how much to store as inventory and where to store these items (at the plant itself, warehouse, or at the retailer etc.).
3. L**ocation-** A number of issues regarding location such as where to locate a plant, where to locate a warehouse facility etc. may have significant bearing on the dynamics of the supply chain and in turn may affect the overall costs.
4. **Transportation-** The issues may be related to how to move a product from one location to another and by what mode of transportation. One needs to evaluate economies of scale on one hand and the desired level of customer satisfaction on the other hand.
5. **Information-** Information is a binding force having critical implications for the supply chain. Information acts as basis for making various decisions in the supply chain. It also acts as an integrator. Unless information flows are handled properly, one may not be able to derive benefits from the supply chain integration.

PRODUCTION

What, how and when to Produce

INVENTORY

How much to make and how much to store

TRANSPORTATION

How and when to move product

LOCATION

Where best to do what activity

**Major Drivers of Supply Chain**

Businesses must align their business strategies around these five drivers. Next, in gaining a high level understanding of these drivers, and how they relate to each other, Hugos recommends that the SCOR Model, developed by the SCC be used. The plan, source, make, deliver, and return categories are the day-to-day operations that determine how well the supply chain works.

**Answer. 03 (a) Importance of Transportation Management in Supply Chain**

**E**very individual and business depends on transportation and supply chain management. Transportation is the movement of people, raw materials, and finished goods. The transportation industry is comprised of various modes that facilitate these movements, entities that utilize these services, and still other entities that build and maintain equipment and facilities that make the movements possible. Supply chain management expands the transportation function to include the total management of materials from their origin as raw commodities to their ultimate delivery as finished products to consumers.

According to the surveys done by the Council of Supply Chain Management Professionals (CSCMP), logistics expense accounts for about 10 percent of the United States gross domestic product, and that transportation spending, by itself represents six percent.

Thus it can be said that transportation is among the largest components of total supply chain costs. With the current global business scenario, effective transportation management requires a thorough understanding of volatile elements like fuel costs, capacity levels and increasing customer requests for tighter, and sometimes more frequent, delivery times.

Transportation refers to the movement of product from one location to another as it makes its way from the beginning of a supply chain to the customer’s handle. In this exciting new broad look at the business of transportation, including Supply Chain Management, Logistics, & procurement. Freight transportation costs in the United States amount to about 6% of the GDP.

Many manufacturers & retailers have found that they can use state of the art supply chain management to reduce inventory & warehousing costs while speeding up delivery to the end customer.

Any supply Chain’s success is closely linked to the appropriate use of transportation. Wal- Mart has effectively used a responsive transportation system to lower its overall costs. At DCs, Wal- Mart uses cross-docking, a process in which product is exchanged between trucks so that each truck going to a retail store has products form different suppliers.

Meanwhile, the booming growth in shipments to & from China is creating both bottlenecks opportunities. Many major corporations have invested in significant buying offices in China, India, & elsewhere.

There are two keys players in any transportation that takes place within a supply chain. The shipper is that party that requires the movement of the product between two points in the supply chain. The carrier is the party that moves or transports the product. For eg, when Dell uses UPS to the ship its computers from the factory to the customer, Dell is the shipper & UPS is the carrier.

There are numbers of factors affecting carrier decisions

The vehicle- related is incurred whether the vehicle is operating or not & is considered fixed for short-term operational decisions by the carrier.

Fixed operating cost is generally proportional to the size of operating facilities. This includes any cost associated with terminals, airport gates & labor that are incurred whether vehicles are operating or not.

Trip-related cost includes the price of labor & fuel incurred for each trip independent of the quantity transported.
Quantity-related cost are loading / unloading costs & a portion of the fuel cost that varies with the quantity being transported.

Overhead cost includes the cost of planning & scheduling a transportation network as well as any investment in information Technology.

A carrier’s decisions are also affected by the responsiveness it seeks to provide its target segment & the prices that the market will bear. The various modes of transportation include water, rail, intermodal, truck, air, and pipeline & package carriers. Water is typically the least expensive mode but is also the slowest whereas air & package carriers the most expensive & the fastest. Rail & water are best suited for low-value. Large shipments that do not need to be moved in a hurry. Air & package carriers are best suited for small, high-value, emergency shipments. Intermodal TL carriers are faster than rail & water but somewhat more expensive. LTL carriers are best suited for small shipments that are too large for package carriers but much less than a TL.

**Making Transportation Decisions in practice:**

Managers should ensure that a firm’s transportation strategy supports its competitive strategy. Firms should evaluate the transportation function based on a combination of transportation costs, other costs such as inventory affected by transportation decisions, & the level of responsiveness achieved with customers.

Managers should consider an appropriate combination of company-owned & outsourced transportation to meet their needs. Wal- Mart has used responsiveness transportation to reduce inventories in its supply chain. Given the importance of transportation to the success of their strategy, they own their transportation Fleet & manage it themselves. Transportation systems for the new economy need to be very responsive but most also be able to exploit every opportunity for aggregation, some cases even with competitors, to help decrease the transportation cost of small shipments. Managers must use the information technology available to help decrease cost & improve responsiveness in their transportation networks. Satellite based communication systems allow carriers to communicate with each vehicle in their fleet.

The supply chain goal is to minimize the total cost while providing the desired level of responsiveness to customers.

**Strategy of Transportation in Supply Chain**

**T**ransportation is a very key element of the logistics process and the supply chain which runs from vendors through to you to your customers. It involves the movement of product, service/speed and cost which are three of the five key issues of effective logistics. It also impacts with the other two logistics-- movement of information and integration within and among suppliers, customers and carriers.

A transportation strategy, to be effective in supply chain management, is not playing one carrier off against another. It is not beating down rates. Rather it is a way to respond to the dynamics of your business, its customers, suppliers and operation.

The strategy, regardless of whether you are involved with domestic or international, is much more and should recognize--

* **Customer requirements.** The supply chain involves continuous and efficient movement of product from vendor to manufacturer to customer. Therefore the transportation program must reflect and meet the customers’ needs. The time and service aspects of transportation are vital.

**Shipments must move timely.** Customers demand their shipments be delivered as they require--on the date needed, by the carrier preferred, in the proper shipping packaging method and complete, both shipped complete and delivered complete and in good order. Being able to have a transportation program with can do this provides customer satisfaction and can give your company a competitive advantage.

* **Mode selection.** How will you move your product, by air versus surface? What roles do transit time play in your supply chain? How will the inventory and service impacts be measured as compared to the freight charges?
* **Carrier relationships.** Volume creates carrier/forwarder attention. Even if you have no strategy, the number of carriers trying to meet with you will make you develop one. Infrequent shipping dictates another approach.

The carrier attention with volume creates a competitive interest in your business. But there is another side to this attention, you cannot divide your business among many carriers. You cannot do this for two reasons. First, as you fracture your business, you fracture your negotiating or leverage position. Second, you will not be able to develop carrier alliances which you need to meet the supply chain service requirements. Developing supply chain responsive programs requires effort by both the carriers and you. Transportation must be responsive and can create a competitive advantage. Doing this means a focus with a carrier--a relationship.

* **Measuring/benchmarking.** You need to know how well your strategy and your carriers are performing. This takes two approaches. One is measuring. Measuring means comparing performance versus standards. What is the actual delivery to customer performance, on a macro basis, carrier and customer by customer basis? A macro measure can hide a problem even if the overall measure is good. And, with supply chain management, you are focusing on each customer and delivery location he has. You should measure your costs to make sure they are controlled. Where are you spending your transport dollars and how well? Freight cost data tied with sales and shipping data makes a great data base for budgeting and managing costs. It provides data for negotiations, developing good freight costs for sales and accounting, for studies and other purposes.

Benchmarking means learning what other companies do--the best practices. Very often benchmarking is not done with a company in your industry. Competitors are not likely to share information. And best practices are not the exclusive of one industry or company.

* **Regulatory impact.** Regulatory changes can change, for better or worse, your strategy. The recent demise of the Interstate Commerce Commission eliminated a safety net for shippers, especially for small shippers. Shippers now need to work with carriers with whom they can develop contractual relationships which reflect the new transport world as to liability, freight class, rate changes, accessorials and other needs.

Potential regulatory changes with the Federal Maritime Commission can also change your strategy. For example, if there is real maritime deregulation, then steamship line conferences will lose their antitrust protection with setting rates and capacity. Shippers will not deal through or with conferences. Instead they will deal directly with steamship lines for service contracts and other needs.

* **Carrier mergers and alliances and closings.** This is an important and difficult issue. In the fifteen years or so since motor carrier deregulation, there have been significant changes. Many carriers went out of business. Others changed their focus from truckload to LTL. New truckload carriers came into being. Maritime has its issues. Large steamship lines in the trans-Pacific and trans-Atlantic trade formed alliances. Now with the recent merger of P&O and Nedlloyd, mergers are beginning to occur.

You have analyze what is happening within each mode and align your strategy with carriers who will still be viable in five years. A great strategy with a carrier who is taken over or goes out of business is suddenly not a good strategy. Now you have to develop one with another carrier, and that takes time.

* **Flexibility.** Change is happening. It is not a question of whether or not it happens. The only question is how quickly it occurs. Your strategy has to be ready to change. New customers. New products. New businesses. New suppliers. New corporate emphasis. Each of these can dramatically change your strategy. Recognize that change will occur. Keep an open ear and mind to other modes and carriers. The times they are a changing--and so will your strategy. **Conclusion.** Transportation is critical to logistics and supply chain effectiveness. It impacts throughout the key issues of logistics effectiveness and the global supply chain. To meet the dynamic requirements of the supply chain, you must have a dynamic strategy. It must be responsive, both as to service and cost demands of your customers and your company.

**Answer. 3 (b) Third Party Logistic (TPL)**

**T**here is a bright future for third-party logistics providers (3PL) and Logistics Service Providers (LSP), for international and/or domestic logistics opportunities. The continuing growth of supply chain management, outsourcing and globalization plus the dynamic effect of e-commerce are driving and will drive growth.

We distinguish 3PL from LSP. A 3PL is a division of a company, often asset-based, that provides transport, warehousing, forwarding, information technology or other logistics or supply chain management related services. 3PL is seen by the parent organization as a way to develop more business for the parent focus. The 3PL also provides higher revenue and higher profit opportunities than the traditional business of the corporation, which is in a commodity-service arena where price is often the key differentiator versus competitors. 3PLs generally are developed to develop profitable business while using the services of the parent company. That can challenge their ability to develop logistics solutions for all possible customers. Not all customers need logistics programs that include the services of the parent company for all or a significant part of the activity.

**Advantages and disadvantages of 3PL**

**O**ne of the advantages of using 3PL results from economies of scale (merits from large truck fleets, warehouses, etc.) and economies of scope, which encourage firms to increase net value by reducing costs. The effects of these economies are obtained depending on the type of 3PL provider (e.g. IT-equipped, marketing-based, non-asset-based (and then flexible), etc.) Competent 3PL providers possess high coordination ability, enabling them to search reliable partners or sub-contractors, and to manage efficiently the inter-firm flow of goods. Such ability can be developed throughexperiences as a 3PL.

Likewise, by outsourcing logistics activities, firms can save on capital investments, and thus reduce financial risks. Investment on logistics assets, such as physical distribution centers or information networks, usually needs large and lump sum costs, which involves financial risks. Furthermore, the 3PL providers can spread the risks by outsourcing to sub-contractors. Following are some basic advantages-

* **Delivery Costs Reduced**
* **Liability Minimized**
* **Insurance Savings**
* **Administrative Costs Lowered**
* **Driver Hiring Is No Longer An Issue**
* **Fuel & Maintenance Costs Eliminated**
* **Capital Investment in Vehicles Eliminated**
* **Vacation, Sick Leave, and Overtime No Longer An Issue**
* **Delivery Costs Are Defined and Consistent**
* **Driver Scheduling & Routing No Longer An Issue**
* **GPS Vehicle Tracking**

Although there are several advantages of using 3PL, some **disadvantages** also exist. It is not easy to establish a reliable and cost-effective partnership between the firm and the 3PL provider. In Order to establish reliable partnership, efforts should be made in two stages; 3PL provider selection and contract signing.

First, in the stage of selecting a new 3PL partner, it is important to select the 3PL provider which has the ability to provide better services. If the firms cannot select reliable 3PL providers, they may suffer from economic losses. It is not easy for firms to judge the ability of the 3PL provider during the selection stage owing to the issue of information asymmetry between the firm (principal) and the 3PL provider (agent). To solve this problem, complex selection procedures are necessary to identify their ability.

However, the complex selection procedures may involve additional transaction costs. Second, it is important to establish a system to maintain their reliable partnership once the 3PL partner is selected. Information sharing and apparent risk sharing between the parties is always required. Concerning information sharing, it is needless to say that smoother information exchange will result in a more efficient logistics activity.

However, related costs may increase if some information essential to the firm would leak. Therefore, the commitment of each party in information sharing is required, and a scheme to ensure these commitments has to be prepared. However, this would also involve additional transaction costs.

Constructing a risk sharing scheme between the firm and the 3PL provider is critical in establishing reliable partnerships. Some of the risks involved in using 3PL are demand risk, inventory risk, and financial risk, among others. The questions are on who will take these risks, and how to compensate the risk holders. "Gain sharing" is a popular example of a rewarding scheme in which the 3PL provider holds part of the risks, and then is given incentives based on the increase of the firm’s profit. This risk-sharing method is apparently some sort of a division of work between the firm and the 3PL provider. Establishing good risk sharing also involves ransaction costs, although the associated costs can be reduced through the cumulative experiences and IT development.



**Answer.4 (a) IT in Supply Chain Management**

**I**nformation flow is an important flow in the supply chain. Without the seamless flow of information, the supply chain cannot operate effectively. Information flow enables coordination between the members of the supply chain. Through the use of information systems, trading partners get access to and exchange information.

IT systems also support the decision making processes of a firm. In this chapter we discussed the importance and use of information in the supply chain and also how information technology makes the supply chain more efficient and responsive. IT systems have evolved from mere transaction processing systems to the decision support systems, which exist at present.

We discussed the IT options available for supply chain operations. These are EDI, Internet technologies, ERP applications and supply chain management software. EDI enables the electronic exchange of key business documents between trading partners. Internet technologies include intranet, extranet, and e-business applications. Intranet is any private network set up within an organization.

Extranet is any private network where customers, suppliers and the internal departments are linked. Later we discussed ERP applications and their features. ERP is a transaction processing system, which enhances information visibility across the firm. We went on to a discussion of SCM software. SCM software can be divided into two components: supply chain planning software and supply chain execution software. Finally we looked at how an IT-enabled supply chain management system can be implemented.

Prior to 1980s the information flow between functional areas with in an organization and between supply chain member organizations were paper based. The paper based transaction and communication is slow. During this period, information was often over looked as a critical competitive resource because its value to supply chain members was not clearly understood. IT infrastructure capabilities provides a competitive positioning of business initiatives like cycle time reduction, implementation, implementing redesigned cross-functional processes. Several well know firms involved in supply chain relationship through information technology. Three factors have strongly impacted this change in the importance of information. First, satisfying in fact pleasing customer has become something of a corporate obsession. Serving the customer in the best, most efficient and effective manner has become critical. Second information is a crucial factor in the managers' abilities to reduce inventory and human resource requirement to a competitive level. Information flows plays a crucial role in strategic planning.

**Supply chain organizational dynamics:**

**A**ll enterprises participating in supply chain management initiatives accept a specific role to perform. They also share the joint belief that they and all other supply chain participants will be better off because of this collaborative effort. Power with in the supply chain is a central issue. There has been a general shift of power from manufacturers to retailers over the last two decade. Retailers sit in a very important position in term of information access for the supply chain. Retailers have risen to the position of prominence through technologies.

The Wal-Mart & P&G experiences demonstrate how information sharing can be utilized for mutual advantage. Through sound information technologies Wal-Mart shares point of sale information from its many retail outlet directly with P&G and other major suppliers.

The development of Inter organizational information system for the supply chain has three distinct advantages like cost reduction, productivity, improvement and product/market strategies.

Barrett and Konsynsik have identified five basic levels of participation of individual firms with in the interorganizational system.

**1. Remote Input/Output mode**: In this case the member participates from a remote location within the application system supported by one or more higher-level participants.

**2. Application processing node**: In this case a member develops and shares a single application such as an inventory query or order processing system.

**3. Multi participant exchange node** : In this case the member develops and shares a network interlinking itself and any number of lower level participants with whom it has an established business relationship.

**4. Network control node:** In this case the member develops and shares a network with diverse application that may be used by many different types of lower level participants.

**5. Integrating network node:** In this case the member literally becomes a data communications/data processing utility that integrates any number of lower level participants and applications in real times.

Four fundamental mistakes made when determining information requirements are as follows:

1. Viewing system as functional instead of cross-functional.

2. Interviewing managers individually instead of jointly.
3. Not allowing for trial and error in detail design process.
4. Asking the wrong question during the interview

**Information and Technology: Application of SCM:**

In the development and maintenance of Supply chain's information systems both software and hardware must be addressed. Hardware includes computer's input/output devices and storage media. Software includes the entire system and application programme used for processing transactions management control, decision-making and strategic planning. Recent development in Supply chain management software is:

1. Base Rate, Carrier select & match pay (version 2.0) developed by Distribution Sciences Inc. which is useful for computing freight costs, compares transportation mode rates, analyze cost and service effectiveness of carrier.

2. A new software programme developed by Ross systems Inc. called Supply Chain planning which is used for demand forecasting, replenishment & manufacturing tools for accurate planning and scheduling of activities.

3. P&G distributing company and Saber decision Technologies resulted in a software system called Transportation Network optimization for streamlining the bidding and award process.

4. Logitility planning solution was recently introduced to provide a programme capable managing the entire supply chain.

**Electronic Commerce:**

It is the term used to describe the wide range of tools and techniques utilized to conduct business in a paperless environment. Electronic commerce therefore includes electronic data interchange, e-mail, electronic fund transfers, electronic publishing, image processing, electronic bulletin boards, shared databases and magnetic/optical data capture. Companies are able to automate the process of moving documents electronically between suppliers and customers.

**Electronic Data Interchange:**

Electronic Data Interchange (EDI) refers to computer-to-computer exchange of business documents in a standard format. EDI describe both the capability and practice of communicating information between two organizations electronically instead of traditional form of mail, courier, & fax. The benefits of EDI are:

1. Quick process to information.
2. Better customer service.
3. Reduced paper work.
4. Increased productivity.
5. Improved tracing and expediting.
6. Cost efficiency.
7. Competitive advantage.
8. Improved billing.

Though the use of EDI supply chain partners can overcome the distortions and exaggeration in supply and demand information by improving technologies to facilitate real time sharing of actual demand and supply information.

**Bar coding and Scanner:**

Bar code scanners are most visible in the checkout counter of super market.  This code specifies name of product and its manufacturer. Other applications are tracking the moving items such as components in PC assembly operations, automobiles in assembly plants.

**Data warehouse:**

Data warehouse is a consolidated database maintained separately from an organization's production system database. Many organizations have multiple databases. A data warehouse is organized around informational subjects rather than specific business processes. Data held in data warehouses are time dependent, historical data may also be aggregated.

**Enterprise Resource planning (ERP) tools:**

Many companies now view ERP system (eg. Baan, SAP, People soft, etc.) as the core of their IT infrastructure. ERP system have become enterprise wide transaction processing tools which capture the data and reduce the manual activities and task associated with processing financial, inventory and customer order information. ERP system achieve a high level of integration by utilizing a single data model, developing a common understanding of what the shared data represents and establishing a set of rules for accessing data.

**Conclusion:** World is shrinking day by day with advancement of technology. Customers' expectations are also increasing and companies are prone to more and more uncertain environment. Companies will find that their conventional supply chain integration will have to be expanded beyond their peripheries. The strategic and technological innovations in supply chain will impact on how organizations buy and sell in the future. However clear vision, strong planning and technical insight into the Internet's capabilities would be necessary to ensure that companies maximize the Internet's potential for better supply chain management and ultimately improved competitiveness. Internet technology, World Wide Web, electronic commerce etc. will change the way a company is required to do business. These companies must realize that they must harness the power of technology to collaborate with their business partners. That means using a new breed of SCM application, the Internet and other networking links to observe past performance and historical trends to determine how much product should be made as well as the best and cost effective method for warehousing it or shipping it to retailer.

**Answer.4 (b) BAR-CODES in Supply Chain-**

**What is a Bar-Code:-** A **barcode** is an optical [machine-readable](http://en.wikipedia.org/wiki/Machine-readable) representation of data, which shows certain data on certain products. Originally, barcodes represented data in the widths (lines) and the spacings of parallel lines, and may be referred to as linear or 1D (1 dimensional) barcodes or symbologies. They also come in patterns of squares, dots, hexagons and other geometric patterns within images termed 2D (2 dimensional) matrix codes or symbologies. Although 2D systems use symbols other than bars, they are generally referred to as barcodes as well. Barcodes can be read by [optical scanners](http://en.wikipedia.org/wiki/Optical_scanner) called [barcode readers](http://en.wikipedia.org/wiki/Barcode_reader), or scanned from an image by special software.

**Use of Bar-Codes in Supply Chain-**

**B**arcode is a mature automatic identification (auto-ID) technology that has been used in supply chain management (SCM) for several decades. Such has been the domination of the auto-ID technique that it has pervaded all facets of SCM, from item-level identification to transportation applications. It has enjoyed free reign especially in the retail sector. However, recently radio-frequency identification (RFID) has been considered a rival technology, more superior in terms of its power to store and update information instantaneously, and non-line of sight (nLoS) ability to be read. Yet RFID is more costly and for the present barcode is still the most widely used and accepted standard worldwide. This paper makes use of document analysis and interviews as sources to support the premise that while RFID may be looming, the need for barcode in the supply chain will never really disappear. What is being observed rather is a pattern of convergence, suggesting a need for both technologies to be integrated into the supply chain, each serving toward a common goal.

Supply chain management is the system of managing the entire set of interconnected businesses including the storage and movement of raw materials, inventory and the whole range of finished goods from their starting point to the final point of consumption. Thus, in a typical business it involves the management of all related activities including sourcing, conversion, procurement of supplies and logistics. It also encompasses activities with intermediate associates, suppliers, service providers and the final customers.

Supply chain management is easily manageable through specialized software, which makes integration of businesses easier. The process becomes even simpler with the aid of barcodes. Barcode technology helps to identify and track products and services since it is an effective identification tool.

“Barcodes have been incorporated into supply chain management for decades since they first identify products, trace their movement and sale right till the time they have to be transported to customers. While their usage in the retail realm remains unparalleled they have also proved to be effective in every other aspect of the business.”

The most important aspect of supply chain management is the need for facts and figures. Information is believed to hold the key to a successful business venture, and companies lacking in keeping track of information now find themselves at a distinct disadvantage. Barcode technology helps keep track of products and services that they identify, and hence provide all the necessary information about them. Every point of the supply chain involves vendors and suppliers who must be able to provide all details when asked. Their inability to do so will mean being left behind and their job assigned to a competitor who has his information ready. The use of barcodes would ensure detailed and correct information, which helps in cutting costs incurred in maintaining high inventory levels for customer products. If barcodes are used then inventory levels can be maintained at low levels and replenished only when the need arises. Barcodes provide accuracy and speed that no other system can match, and help in reducing expenses incurred to rectify errors made by manual oversight or faulty data entry.

Barcode systems include mobile devices that can be used at every point due to their ease of use and time saving advantages. Once a product enters the materials inventory, barcodes help in product identification, its location and tracking its movement. They help in product line applications, and newer manufacturing processes. Barcodes facilitate quality control and the handling of complaints, and finally in shipping at the right time to the right place and the right customer.

In short barcodes assist effective supply chain management in the following ways:

• Time saving by reducing data entry and processing times
• Cost efficiency
• Improved quality of data
• Reduced paper work
• Access to accurate information
• Timely action
• Improved efficiency levels in all business aspects
• Higher returns on investment

Companies providing barcode solutions for supply chain management include Zebra, Naxtor Technologies, Lawson Mobile and hundreds of other companies.

|  |
| --- |
| Successful supply chain management is essential for manufactures and producers. Barcodes still remain in many ways the most important aspect of this, with a label printer and a scanner like the [Symbol LS2208 barcode scanner](http://emobilescan.co.uk/p-2027-symbol-ls2208-handheld-barcode-scanner.aspx),you can begin to implement a supply chain and inventory management system, In the past Few years are have begun to see RFID technology being used more and more to track inventory and the processes involved in getting your stock to your customers. |

**Benefits of BAR-CODE-**

In point-of-sale management, the use of barcodes can provide very detailed up-to-date information on key aspects of the business, enabling decisions to be made much more quickly and with more confidence. For example:

* Fast-selling items can be identified quickly and automatically reordered to meet consumer demand,
* Slow-selling items can be identified, preventing a build-up of unwanted stock,
* The effects of repositioning a given product within a store can be monitored, allowing fast-moving more profitable items to occupy the best space,
* Historical data can be used to predict seasonal fluctuations very accurately.
* Items may be repriced on the shelf to reflect both sale prices and price increases.
* This technology also enabled the profiling of individual consumers, typically through a voluntary registration of discount cards. While pitched as a benefit to the consumer, this practice is considered to be potentially dangerous by privacy advocates.

Besides sales and inventory tracking, barcodes are very useful in shipping/receiving/tracking.

* When a manufacturer packs a box with any given item, a Unique Identifying Number (UID) can be assigned to the box.
* A relational database can be created to relate the UID to relevant information about the box; such as order number, items packed, qty packed, final destination, etc.
* The information can be transmitted through a communication system such as Electronic Data Interchange (EDI) so the retailer has the information about a shipment before it arrives.
* Tracking results when shipments are sent to a Distribution Center (DC) before being forwarded to the final destination.
* When the shipment gets to the final destination, the UID gets scanned, and the store knows where the order came from, what's inside the box, and how much to pay the manufacturer.

**Answer. 5 (a) Enterprise Resource Planning (ERP)**

**Enterprise Resource Planning** (**ERP**) is a term usually used in conjunction with ERP software or an ERP system which is intended to manage all the information and functions of a business or company from shared [data stores](http://en.wikipedia.org/wiki/Data_store)

An ERP system typically has modular hardware and software units and "services" that communicate on a [local area network](http://en.wikipedia.org/wiki/Local_area_network). The modular design allows a business to add or reconfigure modules (perhaps from different vendors) while preserving [data integrity](http://en.wikipedia.org/wiki/Data_integrity) in one shared database that may be centralized or distributed



Many organizations do not have sufficient internal skills to implement an ERP project. This results in many organizations offering consulting services for ERP implementation. Typically, a consulting team is responsible for the entire ERP implementation including:

1. selecting
2. planning
3. training
4. testing
5. implementation
6. delivery

of any customized modules. Examples of customization includes creating processes and reports for compliance, additional product training; creation of process triggers and workflow; specialist advice to improve how the ERP is used in the business; system optimization; and assistance writing reports, complex data extracts or implementing Business Intelligence.

For most mid-sized companies, the cost of the implementation will range from around the list price of the ERP user licenses to up to twice this amount (depending on the level of customization required). Large companies, and especially those with multiple sites or countries, will often spend considerably more on the implementation than the cost of the user licenses—three to five times more is not uncommon for a multi-site implementation.

Unlike most single-purpose applications, ERP packages have historically included full source code and shipped with vendor-supported [team IDEs](http://en.wikipedia.org/wiki/Integrated_development_environment) for customizing and extending the delivered code. During the early years of ERP the guarantee of mature tools and support for extensive customization was an important sales argument when a potential customer was considering developing their own unique solution in-house, or assembling a cross-functional solution by integrating multiple "best of breed" applications.

**"Core system" customization vs configuration**

Increasingly, ERP vendors have tried to reduce the need for customization by providing built-in "configuration" tools to address most customers' needs for changing how the out-of-the-box core system works. Key differences between customization and configuration include:

* Customization is always optional, whereas some degree of configuration (e.g., setting up cost/profit centre structures, organizational trees, purchase approval rules, etc.) may be needed before the software will work at all.
* Configuration is available to all customers, whereas customization allows individual customer to implement proprietary "market-beating" processes.
* Configuration changes tend to be recorded as entries in vendor-supplied data tables, whereas customization usually requires some element of programming and/or changes to table structures or views.
* The effect of configuration changes on the performance of the system is relatively predictable and is largely the responsibility of the ERP vendor. The effect of customization is unpredictable and may require time-consuming [stress testing](http://en.wikipedia.org/wiki/Stress_testing_%28software%29) by the implementation team.
* Configuration changes are almost always guaranteed to survive upgrades to new software versions. Some customizations (e.g. code that uses pre-defined "hooks" that are called before/after displaying data screens) will survive upgrades, though they will still need to be re-tested. More extensive customizations (e.g. those involving changes to fundamental data structures) will be overwritten during upgrades and must be re-implemented manually.

By this analysis, customizing an ERP package can be unexpectedly expensive and complicated, and tends to delay delivery of the obvious benefits of an integrated system. Nevertheless, customizing an ERP suite gives the scope to implement secret recipes for excellence in specific areas while ensuring that industry best practices are achieved in less sensitive areas.

**Strategic and Operational Advantages**

In the absence of an ERP system, a large manufacturer may find itself with many software applications that cannot communicate or interface effectively with one another. Tasks that need to interface with one another may involve:

ERP systems connect the necessary software in order for accurate forecasting to be done. This allows inventory levels to be kept at maximum efficiency and the company to be more profitable.

* Integration among different functional areas to ensure proper communication, productivity and efficiency
* Design [engineering](http://en.wikipedia.org/wiki/Engineering) (how to best make the product)
* Order tracking, from acceptance through fulfillment
* The revenue cycle, from [invoice](http://en.wikipedia.org/wiki/Invoice) through cash receipt
* Managing inter-dependencies of complex processes [bill of materials](http://en.wikipedia.org/wiki/Bill_of_materials)
* Tracking the three-way match between [purchase orders](http://en.wikipedia.org/wiki/Purchase_order) (what was ordered), [inventory](http://en.wikipedia.org/wiki/Inventory) receipts (what arrived), and [costing](http://en.wikipedia.org/wiki/Cost) (what the vendor invoiced)
* The [accounting](http://en.wikipedia.org/wiki/Accounting) for all of these tasks: tracking the [revenue](http://en.wikipedia.org/wiki/Revenue), [cost](http://en.wikipedia.org/wiki/Cost) and [profit](http://en.wikipedia.org/wiki/Profit_%28accounting%29) at a granular level.

ERP Systems centralize the data in one place. Benefits of this include:

* Eliminates the problem of synchronizing changes between multiple systems
* Permits control of business processes that cross functional boundaries
* Provides top-down view of the enterprise (no "islands of information")
* Reduces the risk of loss of sensitive data by consolidating multiple permissions and security models into a single structure.

Some [security](http://en.wikipedia.org/wiki/Security) features are included within an ERP system to protect against both outsider crime, such as [industrial espionage](http://en.wikipedia.org/wiki/Industrial_espionage), and insider crime, such as [embezzlement](http://en.wikipedia.org/wiki/Embezzlement). A data-tampering scenario, for example, might involve a disgruntled employee intentionally modifying prices to below-the-breakeven point in order to attempt to interfere with the company's profit or other sabotage. ERP systems typically provide functionality for implementing [internal controls](http://en.wikipedia.org/wiki/Internal_control) to prevent actions of this kind. ERP vendors are also moving toward better integration with other kinds of information security tools.



**Answer .5 (b)**







**Answer. (7) SHORT NOTES**

(a)**Inventory Turnover Ratio:-** The [ratio](http://www.investorwords.com/4041/ratio.html) of a company's [annual](http://www.investorwords.com/214/annual.html) [sales](http://www.investorwords.com/4365/sales.html) to its [inventory](http://www.investorwords.com/2589/inventory.html); or equivalently, the [fraction](http://www.businessdictionary.com/definition/fraction.html) of a year that an [average](http://www.investorwords.com/347/average.html) item remains in inventory. [Low](http://www.investorwords.com/2900/low.html) [turnover](http://www.investorwords.com/5094/turnover.html) is a [sign](http://www.businessdictionary.com/definition/sign.html) of inefficiency, since inventory usually has a [rate of return](http://www.investorwords.com/4037/rate_of_return.html) of zero. For instance, if a [company](http://www.investorwords.com/992/company.html) was [able](http://www.businessdictionary.com/definition/able.html) to generate $10 million in sales but averaged $5 million in inventory, the inventory turnover would be 10 million / 5 million = 2. This number indicates that there would be 2 [inventory turns](http://www.investorwords.com/5905/inventory_turns.html) [per](http://www.investorwords.com/5714/per.html) year, meaning that it would [take](http://www.investorwords.com/7230/take.html) 6 [months](http://www.businessdictionary.com/definition/month.html) to [sell](http://www.investorwords.com/4467/sell.html) all the inventory.

In other words, “A measure of how often the company sells and replaces its [inventory](http://financial-dictionary.thefreedictionary.com/Inventory). It is the ratio of annual cost of [sales](http://financial-dictionary.thefreedictionary.com/Sale) to the lastest [inventory](http://financial-dictionary.thefreedictionary.com/Inventory). One can also interpret the ratio as the time to which inventory is held. For example a ratio of 26 implies that investory is held, on average, for two weeks. It is best to use this ratio to compare companies within an industry (high turnover is a good sign) because there are huge differences in this ratio across industries”

Inventory Turnover Ratio = Sale

 Inventory

**(c) Electronic data Interchange (EDI):-** Electronic data interchange (EDI) is the electronic movement of data between or within organizations in a structured, computer-retrievable data format that permits information to be transferred from a computer program in one location to a computer program in another location without rekeying. EDI includes the direct transmission of data between locations; transmission using an [intermediary](http://www.answers.com/topic/intermediary) such as a communication network; and the exchange of computer tapes, disks, or other digital storage devices. In many cases, content-related error checking and some degree of processing of the information are also involved. EDI differs from electronic mail in that an actual transaction is transmitted electronically, rather than a simple message consisting primarily of text.

EDI is used for electronic funds transfer (EFT) between financial institutions, which facilitates such common transactions as the direct deposit of [payroll](http://www.answers.com/topic/payroll) checks by employers, the [direct debit](http://www.answers.com/topic/direct-debit-1) of consumer accounts to make [mortgage](http://www.answers.com/topic/mortgage) or utility payments, and the electronic payment of federal taxes by businesses. Another common application of EDI involves the direct exchange of standard business transaction documents—such as purchase orders, invoices, and bills of lading—from one business to another via computer. EDI is also used by retail businesses as part of their electronic scanning and point-of-sale (POS) inventory [replenishment](http://www.answers.com/topic/replenishment-geology%22%20%5Ct%20%22_top) systems. Overall, EDI offers a number of benefits to businesses and—thanks to the rapid evolution of the related technology—is becoming more readily available to small businesses all the time.

**(b) Customer Relationship Management (CRM) Strategy:- Customer relationship management** (**CRM**) are methods that companies use to interact with customers. The methods include employee training and special purpose CRM software. There is an emphasis on handling incoming customer phone calls and email, although the information collected by CRM software may also be used for promotion, and surveys such as those polling customer satisfaction.

Several CRM software packages are available, and they vary in their approach to CRM. However, CRM is not just a technology but rather a comprehensive, customer-centric approach to an organization's philosophy of dealing with its customers. This includes policies and processes, front-of-house [customer service](http://en.wikipedia.org/wiki/Customer_service), employee training, marketing, systems and information management. Hence, it is important that any CRM implementation considerations stretch beyond technology toward the broader organizational requirements.

The objectives of a CRM strategy must consider a company’s specific situation and its customers' needs and expectations. Information gained through CRM initiatives can support the development of marketing strategy by developing the organization's knowledge in areas such as identifying customer segments, improving customer [retention](http://en.wikipedia.org/wiki/Retention), improving product offerings (by better understanding customer needs), and by identifying the organization's most profitable customers.[[8]](http://en.wikipedia.org/wiki/Customer_relationship_management#cite_note-crmunplugged-7)

CRM strategies can vary in size, complexity, and scope. Some companies consider a CRM strategy only to focus on the management of a team of salespeople. However, other CRM strategies can cover customer interaction across the entire organization. Many commercial CRM software packages provide features that serve the sales, marketing, event management, project management, and finance industries

(e) **Reverse Supply Chain:-** [Reverse logistics](http://en.wikipedia.org/wiki/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.

**Reverse logistics** stands for all operations related to the reuse of products and materials. It is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics. The reverse logistics process includes the management and the sale of surplus as well as returned equipment and machines from the hardware leasing business. Normally, [logistics](http://en.wikipedia.org/wiki/Logistics) deal with events that bring the product towards the customer. In the case of reverse, the resource goes at least one step back in the [supply chain](http://en.wikipedia.org/wiki/Supply_chain). For instance, goods move from the customer to the distributor or to the manufacturer.

(f)  **Efficient Consumer Response:-** **Efficient Consumer Response** ([ECR](http://en.wikipedia.org/wiki/ECR)) is a joint trade and industry body working towards making the grocery sector as a whole more responsive to consumer demand and promote the removal of unnecessary costs from the supply chain.

The ECR movement beginning in the mid-nineties was characterized by the emergence of new principles of collaborative management along the supply chain. It was understood that companies can serve consumers better, faster and at less cost by working together with trading partners. The dramatic advances in information technology, growing competition, global business structures and consumer demand focused on better choice, service convenience, quality, freshness and safety, made it apparent that a fundamental reconsideration of the most effective way of delivering the right products to consumers at the right price was much needed. Non-standardized operational practices and the rigid separation of the traditional roles of manufacturer and retailer threatened to block the supply chain unnecessarily and failed to exploit the synergies that came from powerful new information technologies and planning tools. In other words, ECR allows companies to seek a competitive advantage by demonstrating their superior ability in working together with trading partners to add value to the consumer.

There are four focus areas under ECR: [Demand management](http://en.wikipedia.org/wiki/Demand_management), [Supply management](http://en.wikipedia.org/wiki/Supply_management), Enablers and Integrators, which are intended to be addressed as an integrated set. These form the basis of the ECR Global Scorecard.

To better serve the consumer, ECR has set out to invert the traditional model and break down non-productive barriers. The impacts have been extensive and continue to resonate across industry.