KAMARAJ COLLEGE

SELF FINANCING COURSES

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STUDY MATERIAL FOR

BBA (S& L)

SUPPLY CHAIN MANAGEMENT

VI - SEMESTER

ACADEMIC YEAR 2022 - 2023

PREPARED,

BY

DEPARTMENT OF BBA (S&L),

KAMARAJ COLLEGE,

THOOTHUKUDI.

SUPPLY CHAIN MANAGEMENT

Course objectives:

The paper aims to educate students on stages of supply chain management and new opportunities in SCM

COURSE OUTCOMES:

CO: TO Appreciate the challenges of SCM Activities.

CO: TO Appreciate the differences between supply chain management and its barriers.

CO: Recognize the challenges faced in services of SCM.

CO: Understand the fundamentals of elements and functions of supply chain.

CO: TO Understand appraise and integrate various supply chain strategies.

CO: TO develop analytical and critical understanding and skills for planning, designing of supply chain

Unit I

SCM – Definition - Objectives-evolution-need-issues involved in developing SCM framework –types-SCM activities-constituents-Organization.

Unit II

Supply chain integration – stages- Barriers to internal integration – Achieving excellence in SCM-Dimensions of supply chain Excellence –Forces influencing SCE Emotions, physical and financial supply chains-check list for Excellence.

Unit III

Purchasing and supply management-introduction-importance objectives purchasing process-purchasing and other functions –purchasing and integrated logistics interfaces-types of purchases-partnerships-materials souring-just-in-time purchasing.

Unit IV

Outsourcing in SCM – Meaning need-outsourcing risks-outsourcing process outsourcing in SCM-new opportunities in SCM outsourcing –myths of SCM outsourcing.

Unit V

Performance measurement in SCM –meaning-advantages of performance measures-The benefits of performance measurement –measuring SCM-supplier performance measurement –parameters choosing suppliers.

UNIT - I

SCM-Definition-objectives-evolution-need-issues involved in developing SCM framework –types-SCM activities-constituents-Organization.

1.1 Introduction to supply chain management (SCM)

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, 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 from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.

The organizations that make up the supply chain are ―linked‖ together through physical flows and information flows.

Fig.No.1 Supply Chain Management-Process

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 firm.

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.

1.2 Concept of SCM

Supply Chain Concepts:

Before an organization tries to focus on supply chain management, its leaders must determine what the supply chain encompasses. Just as you can‘t manage what you don‘t measure, you can‘t plan and execute what you haven‘t clearly defined. Hence, it is important to articulate the overall purpose, scope, and components of a supply chain. Following are useful supply chain definitions that highlight critical aspects of a supply chain.

- From the Council of Supply Chain Management Professionals (2010) —the material and informational interchanges in the logistical process, stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers, and customers are links in the supply chain.
- From Christopher Martin L. (1992) —the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer.
- From Coyle, Langley, Novak, and Gibson (2013)—A series of integrated enterprises that must share information and coordinate physical execution to

ensure a smooth, integrated flow of goods, services, information, and cash through the pipeline.

Linear representation of a supply line:

In truth, supply chains require a multiplicity of relationships and numerous paths through which products and information travel. This is better reflected by the conceptual diagram of a supply chain in Figure, in which the supply chain is a web or network of participants and resources. To gain maximum benefit from the supply chain, a company must dynamically draw upon its available internal capabilities and the external resources of its supply chain network to fulfill customer requirements.

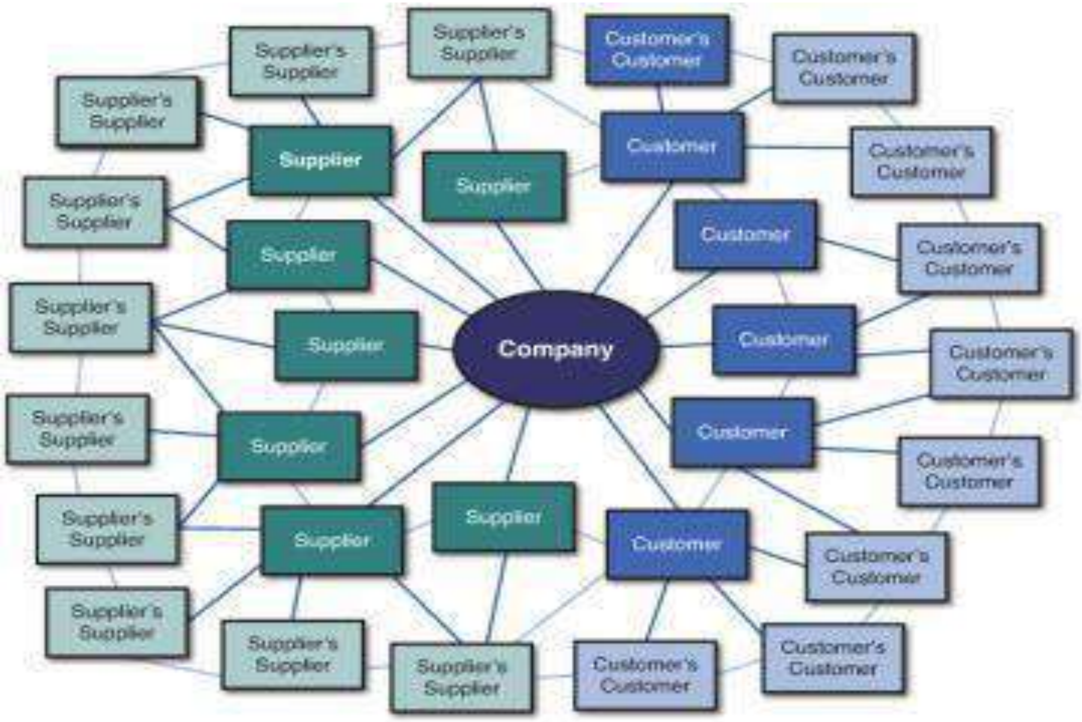


Fig No.2Network representation of a supply chain

Simple representations aside, it is critical to understand that no two supply chains are exactly alike. An organization's supply chain structure and relationships will be influenced by its industry, geographic scope of activity, supply base, product variety, fulfilment methods, and demand patterns. Consider, for example, a multinational manufacturer and a local farm-to-table restaurant.

Supply Chain Management Perspectives:

I ntroduced in the early 1980s, the term supply chain management began to take hold in the mid-1990s and is now part of the everyday business lexicon. Whereas a supply chain is an entity that exists for the fulfillment of customer demand, supply chain management involves overt managerial efforts by the organizations within the supply chain to achieve results (Mentzer et al., 2001). These efforts can be strategic or operational in nature, though the vast majority of respondents to a Council of Supply Chain Management Professionals survey indicate that the primary role of supply chain management within an organization is a combination of strategy and activity (Gibson, Mentzer, & Cook, 2005).

Following is a sampling of relevant definitions:

- From the Council of Supply Chain Management Professionals (2011)—The planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities.
- From Gartner (2013b)—The processes of creating and fulfilling demands for goods and services. It encompasses a trading partner community engaged in the common goal of satisfying end customers.
- From LaLonde (1997)—The delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing to consumption.
- From Stock and Boyer (2009)—The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing.

Although the definitions vary in length and complexity, they collectively focus on three themes: activities, participants, and benefits (Stock & Boyer, 2009). When this is accomplished, the benefits of enhanced customer satisfaction and retention will be achieved.

Related Terms and Concepts:

Supply chain management encompasses a number of business processes, activities, and goals that are discussed throughout this book. Before moving forward, it is valuable to clarify their meanings and relevance to supply chain management.

Logistics Management:

Logistics is a fundamental set of supply chain processes that facilitates fulfilment of demand. The goal is to supply the right product or service, at the right place, at the right time.

The Council of Supply Chain Management defines logistics management. Whether provided internally, by a supplier, by the customer, or by an external logistics services provider, these capabilities are essential for achieving supply chain success.

Supply Management:

Supply management focuses on the identification, acquisition, access, positioning, management of resources, and related capabilities the organization needs or potentially needs in the attainment of its strategic objectives (Institute for Supply Management, 2010). For most organizations, logistics controls the distribution of products; whereas supply management controls the strategic sourcing of direct materials, finished goods, services, capital equipment, and indirect materials.

Value Chain:

The concept of a value chain was developed as a tool for competitive analysis and strategy. It is composed of primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) and support activities (infrastructure, human resource management, technology development, and procurement) that work together to provide value to customers and generate profits for the organization (Porter, 1985). A value with integrated supply chain processes enabling the flows of products and services in one direction, and the value chain generating demand and cash flows from customers (Ramsey, 2005).

Distribution Channel:

Distribution channels support the flow of goods and services from the manufacturer to the final user or consumer (Council of Supply Chain Management Professionals, 2010). An organization.

Supply Chain Management Concepts:

Shortly after your alarm clock goes off and the coffee maker kicks on, the aroma of your favourite coffee fills the air. The supply chain is responsible for getting those coffee beans across the world and to your kitchen. SCM involves a series of key activities and processes that must be completed in an efficient (fuel-conserving, cost-reducing, etc.) and timely manner. Otherwise, product will not be available when needed by consumers like you.

The Seven Rights of Fulfilment:

The ability to meet customer requirements, for everything from coffee beans to Crocs, is built upon the expectation that everything is done correctly in the supply chain. And that means doing it right the first time – no mulligan’s, no mistakes are allowed. In the quest to provide quality service and satisfy customers, world-class companies along the supply chain are guided by the Seven Rights of Fulfilment.

If you think about it, every order needs to be executed according to these seven goals.

You must attempt to deliver a ―perfect order‖ to every customer every time.

A seller‘s ultimate goal is to make the customer happy by doing the job right, which gives them a good reason to use the seller‘s services again in the future.

SCM Flows:

If the goal of SCM is to provide high product availability through efficient and timely fulfillment of customer demand, then how is the goal accomplished? Obviously, you need effective flows of products from the point of origin to the point of consumption. But there‘s more to it. Consider the diagram of the fresh food supply chain.

Because of all the processes that have to take place at different types of participating companies, each company needs supply chain managers to help improve their flows of product, information, and money.

SCM Processes:

Supply chain activities aren't the responsibility of one person or one company. Multiple people need to be actively involved in a number of different processes to make it work. It's kind of like baseball. While all the participants are called baseball players, they don't do whatever they want. Each person has a role – pitcher, catcher, shortstop, etc. – and must perform well at their assigned duties – fielding, throwing, and/or hitting – for the team to be successful.

Winning the SCM ―game‖ requires supply chain professionals to play similar roles. Each supply chain player must understand his or her role, develop winning strategies, and collaborate with their supply chain teammates. By doing so, the SCM team can flawlessly execute the following processes:

- **Planning** – the plan process seeks to create effective long- and short-range supply chain strategies. From the design of the supply chain network to the prediction of customer demand, supply chain leaders need to develop integrated supply chain strategies.
- **Procurement** – the buy process focuses on the purchase of required raw materials, components, and goods. As a consumer, you're pretty familiar with buying stuff!
- **Production** – the make process involves the manufacture, conversion, or assembly of materials into finished goods or parts for other products. Supply chain managers provide production support and ensure that key materials are available when needed.
- **Distribution** – the move process manages the logistical flow of goods across the supply chain. Transportation companies, third party logistics firms, and others ensure that goods are flowing quickly and safely toward the point of demand.
- **Customer Interface** – the demand process revolves around all the issues that are related to planning customer interactions, satisfying their needs, and fulfilling orders perfectly.

1.3 Components of SCM:

Supply chain management (SCM) is the process of converting the raw materials in to a product or service and delivers it to customers. The following are five basic components of SCM.

Planning:

It is the strategic activity of SCM and the companies need a perfect planning for managing all the resources that meet the customers demand for their product or service and satisfies the customer. SCM planning is to be developed in such a way that it costs effective and delivers high quality and value to customers.

Sourcing:

Companies need to choose reliable suppliers or vendors to deliver the goods and services with which the company creates the product. Therefore, supply chain managers must develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving the relationships. The vendors should supply the inventory as per the demand and the SCM managers should also take care of the quality of the material supplied, and verify shipments, transfer them to the manufacturing facilities and authorizing supplier payments.

Making:

This is the manufacturing step in the SCM and the supply chain managers schedule the activities necessary for production, testing, packaging and preparation for delivery. In this step companies can measure quality levels, production output and worker productivity.

Delivering:

This is the step where the goods stored in the warehouses are delivered to the customers through an efficient distribution system as soon as the company receives the order from the customers and it is referred as logistics. This also includes an invoicing system to receive payments.

Return:

This is the step in the supply chain where the company receives back a defective and excess product from the customers. To effectively implement this process supply chain planners, have to create a responsive and flexible network as it can be a problematic part of the supply chain for many companies. According to Lambert and Cooper (2000) the following are the components of supply chain management:

- 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

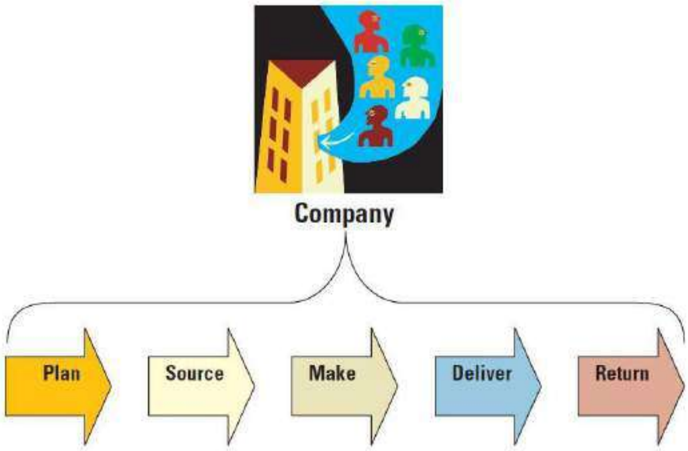


Fig No:3 Components of SCM

1.4.1Features of SCM:

Top Six Supply Chain Management Features:

Supply chain management features allow companies to run businesses more effectively. Finding the right software that will make your company shine is the key to a great business decision. There are a few key supply chain management features that you want to look for when you are searching for supply chain vendors. If you can find these six features in your software then chances are you are making a great business decision.

Management of Inventory:

One of the supply chain management features that you want to look for is excellent inventory management. The software should be able to maintain stability with tracking of inventory as well as the finished goods. This function should also include the ability to track materials needed for production and eliminate any excess waste that may be costing your company extra money. This will not only help with the reducing of cost spent on materials, but also on the issue of storage.

Managing of Orders:

Another of the key supply chain management features is the ability to manage orders through your company.

Procurement:

One key supply chain management feature is the ability to create lasting relationships with your clients. In doing this you want to make sure that all tasks associated with a particular order are being tracked properly. This will help you not only in your customer service area but also in the area of negotiating for sales.

Logistics:

As your company expands, you want to make sure your software will expand with you. You want to make sure you have a supply chain management feature that will allow your company room to grow; whether locally or globally. This will help to save you money in the long run because no further software will need to be purchased to keep your company running.

Planning and Forecasting:

If your company produces a product that is popular around holiday times then you want to be able to predict the demand you may have at a certain time of year. The right supply chain management features will help you in this battle by looking at years past data and seeing where you will be at that same time in the year.

Managing of Returns:

Finally, the last supply chain management feature to mention is the return management. If your product is defective or broken when it arrives at your customers‘location then chances are you are going to have a very unhappy customer. Let your supply chain management feature handle this for you. The automatic processing of claims is one way that the software will help eliminate this headache.

1.4.2 Issues and challenges in supply chain Management

- **In Supply Chain Integration**

Supply chain management (SCM) executives face unique challenges, with respect to integrating supply chain specific strategies with the overall corporate business strategy. However, the general understanding of the business environment in most industries is that competition has increased and the conditions under which business is made are more turbulent. Many researchers have mentioned a classification of supply chain integration challenges. SC integration challenges can be classified through the challenge of system relationships; the SCM system has two kinds of relationships, which are the relation between sub-systems, and the relationship between SCM system and the business strategies, this classification emphasizes the technical challenges that came from the relation between SCM system and internal business strategy, unfortunately this classification bypass the challenges that the companies may face from external environment.

- **In Information Sharing**

Information sharing in a supply chain faces several hurdles. The first and foremost challenge is that of aligning incentives of different partners. It would be naïve of a partner to think that information sharing and cooperation will automatically increase his or her profit. In fact, each partner is wary of the possibility of other partners abusing information and reaping all the benefits from information sharing. The first and foremost challenge is that of aligning incentives of different partners. This is consistent with economists. Finding that a powerful monopolistic or monopolistic partner can extract all economic profit from his or her partner, but one way of defending a positive profit for the weaker party is to keep the cost hidden and maintain informational superiority. The profit associated with superior information is often called the informational rent. Even when each partner is guaranteed a positive gain in return for information sharing, each partner can play a non-cooperative game and haggle over how much. This may potentially lead to a failure to share information. Thus, trust and cooperation become critical ingredients in a supply chain partnership.

This practice may be a subject of scrutiny by the antitrust authorities. Again, but for a different reason now, the supplier must make sure that the shared information will not be used beyond the original intent. Technology is another constraint in information sharing. Implementation of a cross-organizational information system is costly, time-consuming and risky.Finally, we should note that information sharing is only an enabler for better coordination and planning of the supply chain. Hence, companies must develop capabilities to utilize the shared information in an effective way.

1.4.3 SCM current scenario:

In the current competitive scenario supply chain management assumes a significant importance and calls for serious research attention, as companies are challenged with finding ways to meet ever-rising customer expectations at a manageable cost. The term „supply chain management‟ has not only been used to explain the logistics activities and the planning and control of materials and information flows internally within a company or externally between companies (Christopher 1992, Cooper et al.,1997 and Fisher, 1997). Researchers have also used it to describe strategic, inter organizational issues (Cox, 1997, Harland et al., 1999), to discuss an alternative organizational form to vertical integration (Thorelli ,1986 Hakansson and Snehota, 1995), to identify and describe the relationship a company develops with its suppliers (Helper, 1991and Hines, 1994, Narus and Anderson, 1995), and to address the purchasing and supply perspective (Morgan and Monczka, 1996 and Farmer, 1997).

Functional areas of Logistics:

- Network Design
- Information Technology
- Transportation
- Inventory and Storage
- Warehousing
- Materials Handling, Loading and unloading
- Packaging and Re-packaging

It should be noted that supply chain management has both ―hard‖ (i.e., technical) and ―soft‖ (i.e., people) aspects, reflecting the fact that the field is at the intersection of many disciplines, such as marketing, procurement, management, operations research, logistics,helping to understand how patterns of personal relationships translate to competitive advantage through diffusion of information, social control of opportunism, coordination and aid and so on (Stephen P. and Xunli, 2009). The impact of supply chain management to the supplier may be more difficult to classify, initially, as benefits. They may vary, but may include:

- Fewer orders initially while the customer draws down excess inventories.
- Small and more frequent orders.
- Vendor carries inventory, not the customer.
- Higher warehousing costs for picking smaller and more orders.
- Higher freight costs for shipping smaller order and more orders.
- Penalties for not meeting the customer's requirements.
- Possible loss of business for not meeting the customer's requirements.

Suppliers play a crucial role because they help Indian firms to improve supply chain cost, responsiveness, reliability and its competitiveness. Therefore, management of sourcing in terms of Supply Risks (i.e., delays in receipt of the material; or mismatch in quantity supplied; or material being of inferior quality or damaged; or the alteration in commercial terms delaying the supply) is very crucial. A solution to this problem is to manage supply delays by managing the supply risks. Supply Risk is defined as, — This is the most challenging job for SCM to keep all the customers satisfied rather delighted. Emphasis is presently on the initial customer-supplier link. (Ketkar and Vaidya, 2012) The effects ripple through the supply chain, it is more like a "whisper down the lane" impact, where suppliers are not clear as to their role and what they must do. Customers want more quality, design, innovation, choice, convenience and service, and they want to spend less money, effort, time and risk. The supply chain of a company consists of different departments, ranging from procurement of materials to customer service.

Companies that learn how to improve management of their supply chain will become the new success stories in the global market place. Study on Benchmarking shows significant cost differences between organizations that exhibit best-in class performance and those with average performance. Traditionally, Supply Chain Management (SCM) has been a melting pot of various aspects, with influences from logistics and transportation, operations management and materials and distribution management, marketing, as well as purchasing and information technology (IT).

1.5.1Value Chain Management (VCM)

Definition:

Value chain management (**VCM**) is a strategic business analysis tool used for the seamless integration and collaboration of value chain components and resources. VCM focuses on minimizing resources and accessing value at each chain level, resulting in optimal process integration, decreased inventories, better products and enhanced customer

satisfaction.

VCM was introduced in the mid-1980s by Michael Porter, a business strategy authority and long-time Harvard Business School professor. VCM has evolved into a universally applied business management strategy, and is a powerful strategic planning tool that extends from organizations to distribution and supply networks.

VCM requires the following components:

- Integrated chain strategy, planning and scheduling
- An efficient supply chains
- Full and interdependent chain resource management and optimization
- Integrated customer insight data and information

Value Chain Management:

Value chain management is also concerned with the flow of goods to consumers, but takes a different approach. You might say it‘s the complementary view of the process. The difference between the two is that in supply chain management, the flow is down – from the source to the consumer.

Value chains are strategic, placing heavy focus on:

- Innovation
- Research and Development
- Product Testing
- Marketing
- Social Trend Analysis
- Economic Conditions

1.5.2 Customers relations management:

What is CRM? CRM stands for Customer Relationship Management and was first coined in the 1990s. The literal and original meaning of the expression ―Customer Relationship Management‖ was, simply, managing the relationship with your customer.

Importance of CRM:

Customer Relationship management is the strongest and the most efficient approach in maintaining and creating relationships with customers. Customer relationship management is not only pure business but also ideate strong personal bonding within people. Development of this type of bonding drives the business to new levels of success.

- A CRM system consists of a historical view and analysis of all the acquired or to be acquired customers. This helps in reduced searching and correlating customers and to foresee customer needs effectively and increase business.
- CRM contains each and every bit of details of a customer, hence it is very easy for track a customer accordingly and can be used to determine which customer can be profitable and which not.
- In CRM system, customers are grouped according to different aspects according to the type of business they do or according to physical location and are allocated to different customer managers often called as account managers. This helps in focusing and concentrating on each and every customer separately.
- A CRM system is not only used to deal with the existing customers but is also useful in acquiring new customers. The process first starts with identifying a customer and maintaining all the corresponding details into the CRM system which is also called an ‗Opportunity of Business'. The Sales and Field representatives then try getting business out of these customers by sophistically following up with them and converting them into a winning deal. All this is very easily and efficiently done by an integrated CRM system.
- The strongest aspect of Customer Relationship Management is that it is very cost-effective. The advantage of decently implemented CRM system is that there is very less need of paper and manual work which requires lesser staff to manage and lesser resources to deal with. The technologies used in implementing a CRM system are also very cheap and smooth as compared to the traditional way of business.
- All the details in CRM system is kept centralized which is available anytime on fingertips. This reduces the process time and increases productivity.
- Efficiently dealing with all the customers and providing them what they actually need increases the customer satisfaction. This increases the chance of getting more business which ultimately enhances turnover and profit.
- If the customer is satisfied they will always be loyal to you and will remain in business forever resulting in increasing customer base and ultimately enhancing net growth of business.

UNIT – II

Supply chain integration – stages- Barriers to internal integration –Achieving excellence in SCM-Dimensions of supply chain Excellence – Forces influencing SCE Emotions, physical and financial supply chains-check list for Excellence.

2.1.1Demand planning:

Demand planning is a multi-step operational supply chain management (SCM) process used to create reliable forecasts. Effective demand planning can guide users to improve the accuracy of revenue forecasts, align inventory levels with peaks and troughs in demand, and enhance profitability for a given channel or product.

The approach begins with a statistical forecast. Data sources for the forecast include planned sales orders, customer contracts and intercompany standing orders. The final forecast is shared with key stakeholders, such as suppliers.

Key steps in demand planning include:

- Importing historical sales data
- Creating statistical forecasts
- Importing customer forecasts
- Collaborating with customers
- Managing forecasts
- Building consensus forecasts
- Supply and demand collaboration
- Securing constrained forecasts
- Confirmation with customers
- Re-examining data and adjusting planning accordingly.

The success of a supply chain is often linked to its efficiency, which can be traced back to the ability of managers to conduct accurate forecasting when it comes revenue and inventory. Those two facets of a business are tied to a crucial process in the world of supply chain: demand planning.

Demand planning uses analytics that examine historical sales data, customer orders ,shipments, current sales and market indicators to better predict demand patterns based on market changes, enabling firms to make smart decisions about inventory and production levels.

Good demand planning is highly accurate, based on data and enhances profitability.

Without proper demand planning, supply chains wind up dealing with production delays, inventory surpluses and strained relationships across the various disciplines that make up an organization. Avoiding such problems would call for professionals that possess two important skill sets:

Applying the data to the company‘s business model

2.1.2 Purchase planning:

For complex purchases, the purchasing organization, guided by the purchase team, usually prepares the plan. Plans are developed when the purchasing organization becomes aware of a customer's requirement, or receives a purchase request, statement of work, or other information sufficient to begin the planning process.

Basics of Purchase Planning:

Purchase planning for a wholesale distribution operation is a critical issue. Since purchasing is linked directly to stocking levels, it can mean the difference between profit and loss. In wholesale distribution, stock is sold at a unit cost very close to the purchase price, so overstocking will immediately have a negative effect on profits.

Importance of Purchase Planning

Effective purchase planning is essential to furthering the business and competitive interests of the Postal Service. As such, it requires the coordination and cooperation of a number of organizations and must address a number of topics. As stated in 2.1.2, early involvement among all of the stakeholders often proves critical to successful planning and successful purchasing. The extent of the planning will depend on the nature of the purchase and its effect on the business and competitive objectives of the Postal Service.

Preliminary Planning

Organizations normally plan their purchasing needs during the budget process. Because purchase planning should involve everyone with a stake in the outcome, coordination between internal postal business partners should begin as early as possible.

Purchase Planning

Purchase planning is the process of establishing objectives and tactics to obtain the best value in a specific purchase. It is done by a purchase team made up of the Postal Service business partners with an interest in the purchase, including the organization requesting the purchase, the purchasing organization, and other organizations needed to help determine best value.

Purchase team members have specific roles in purchase planning.

1. The organization requesting the purchase:

- Determines the supply or service required.
- Helps to identify potential suppliers.
- Ensures that funds are available and authorized.
- Provides a purchase description.
- Prepares a price or cost estimate.
- Defines the period of performance or delivery.
- Establishes any supplier reporting requirements.
- Assists in developing the supplier-selection strategy and the proposal-specific performance evaluation factors.

2. The purchasing organization:

- Through the contracting officer, serves as business leader of the purchase team.
- Gathers and analyzes relevant spend and demand data to identify opportunities for strategic sourcing and consolidated purchases.
- Provides advice and assistance.
- Identifies new or competitive sources, including small, minority, and womanowned businesses and, when appropriate, ensures that enough suppliers are available to ensure adequate competition.

- Prequalifies suppliers and maintains source lists.
- Maintains and applies cost and pricing models to optimize total cost of ownership.

3. For many purchases, the materials organization may provide specific expertise, including:

- Transportation planning, including FOB origin/destination price evaluation.
- Identifying the total cost of ownership related to logistics activities (movement, storage, redistribution, and disposal).
- Providing alternatives and recommendations for the ordering and delivery of supplies and services.
- Develops a freight transportation plan which considers alternatives and recommendations.

4. The purchase team may include other members whose specialized support (for example, legal or technical) will ensure that business considerations outside the purchasing process are included (for example, maintenance or training).

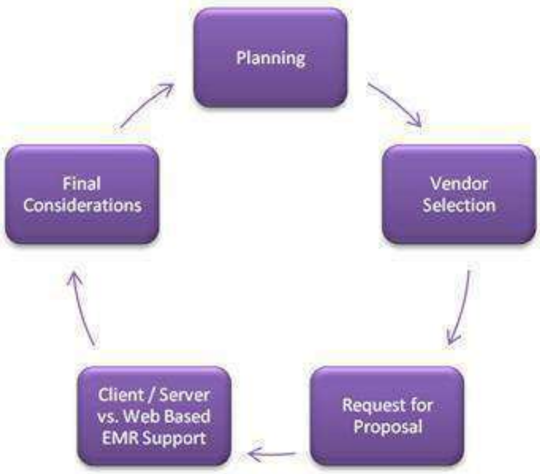


Fig No:4 Purchase Planning

2.2 'Make-Or-Buy Decision'

A make-or-buy decision is the act of choosing between manufacturing a product in-house or purchasing it from an external supplier to produce at required levels.

'Make-Or-Buy Decision'

Also referred to as the outsourcing decision, the make-or-buy decision compares the costs and benefits associated with producing a necessary good or service internally to the costs and benefits involved in hiring an outside supplier for the resources in question.

Make Costs:

In regards to in-house production, a business must include expenses related to the purchase and maintenance of any production equipment as well as the cost of production materials.

Buy Costs:

Costs relating to purchasing the products from an outside source must include the price of the good itself, any shipping or importing fees, and applicable sales tax charges.

Decision-Making Points:

The results of the quantitative analysis may be sufficient to make a determination based on the approach that is more cost-effective. At times, qualitative analysis addresses any concerns that cannot be measured specifically.

This is why most of the electronic items manufactured and software systems developed in the Asia, on behalf of the organizations in the USA and Europe.

Four Numbers You Should Know

When you are supposed to make a make-or-buy decision, there are four numbers you need to be aware of. Your decision will be based on the values of these four numbers. Let's have a look at the numbers now. They are quite self-explanatory.

- The volume
- The fixed cost of making

- Per-unit direct cost when making
- Per-unit cost when buying

Now, there are two formulas that use the above numbers.

Cost to Buy(CTB)=Volume x Per-unit cost when buying

Cost to Make(CTM)=Fixed costs +(Per-unit direct cost x volume)

Reasons for Making

There are number of reasons a company would consider when it comes to making in-house. Following are a few:

- Cost concerns
- Desire to expand the manufacturing focus
- Need of direct control over the product
- Intellectual property concerns
- Quality control concerns
- Supplier unreliability
- Lack of competent suppliers
- Volume too small to get a supplier attracted
- Reduction of logistic costs (shipping etc.)
- To maintain a backup source
- Political and environment reasons
- Organizational pride

Reasons for Buying:

Following are some of the reasons companies may consider when it comes to buying from a supplier:

- Lack of technical experience
- Supplier's expertise on the technical areas and the domain
- Cost considerations
- Need of small volume
- Insufficient capacity to produce in-house
- Brand preferences
- Strategic partnerships

Process:

The make or buy decision can be in many scales. If the decision is small in nature and has less impact on the business, then even one person can make the decision. The person can consider the pros and cons between making and buying and finally arrive at a decision.

1. **Preparation**

- Team creation and appointment of the team leader
- Identifying the product requirements and analysis
- Team briefing and aspect/area destitution

2. **Data Collection**

- Collecting information on various aspects of make-or-buy decision
- Workshops on weightings, ratings, and cost for both make-or-buy

3. **3.Data Analysis**

- Analysis of data gathered

4. **4. Feedback**
- Feedback on the decision made

By following the above structured process, the organization can make an informed decision on make-or-buy.

Conclusion:

Make-or-buy decision is one of the key techniques for management practice. Due to the global outsourcing, make-or-buy decision making has become popular and frequent. Since the manufacturing and services industries have been diversified across the globe, there are a number of suppliers offering products and services for a fraction of the original price.

2.3.1 Indigenous:

Indigenous means Originating or occurring naturally in a particular place.

2.3.2 Global sourcing:

Global sourcing is the practice of sourcing from the global market for goods and services across geopolitical boundaries. Global sourcing often aims to exploit global efficiencies in the delivery of a product or service.

While these examples are examples of Low-cost country sourcing, global sourcing is not limited to low-cost countries.

Majority of companies today strive to harness the potential of global sourcing in reducing cost. Hence it is commonly found that global sourcing initiatives and programs form an integral part of the strategic sourcing plan and procurement strategy of many multinational companies.

Stage 1: Preliminary Research – Investigation and Tendering

At this stage, the enterprise identifies the core and non-core operational activities, analyzes customer and market requirements and identifies competitors. The idea is to develop the firm‘s business objectives, prospective markets and brand positioning.

Stage 2: Market and Supplier Evaluation

At this stage, the enterprise develops a detailed list of suppliers selection benchmarks, which is used to select the most appropriate suppliers that fit the requirements. Based on the findings of the process, the sourcing strategy may be tweaked further and a final costing model is released. The operational and economic benefits of the project will then be estimated. RFIs will then be sent out to the shortlisted suppliers.

Stage 3: Selection of the Supplier (Sourcing Event)

Based on the results of the RFI dispatch, a final list of suppliers is selected and negotiation for products is carried out, culminating in a supply agreement.

Stage 4: Implementation

A performance analysis schedule should be developed, outlining all activities in the implementation process. The implementation team should be constituted by the procurement agent and the schedule and strategy should be published.

Stage 5: Performance Monitoring

Performance of suppliers is measured, both independently and in relation to the resources and processes applied by supply partners. This should be carried out routinely and reported accordingly. **Cost** – the main purpose of product sourcing strategy is to take advantage of lower labour costs in foreign countries. However, the procuring organization will face additional costs that don‘t factor into domestic transactional costs. These include broker fees, freight charges, taxes called, insurance, duties and bank fees.

- **Laws**
  The sourcing specialist together with the supplier should consider what body of law shall be applied to their contractual agreement, i.e., the buyer‘s country‘s law, the supplier‘s country‘s law or the law applicable through a signed treaty between the 2 countries.
- **Currency**
  Some buyers may insist on transactions in their own currency for the sake of simplicity. However, a prudent buyer will consider the possibility of using the supplier‘s currency where the buying country‘s currency may become stronger in the period between agreement and supply and eventual payment.
- **Lead time**
  Global purchases have a significantly longer lead time than domestic sources. The reason is that overseas travel is slower, unless air travel is used. In addition, there is time taken in the custom clearance process, which does not apply for domestic sources.
- **Culture and language**
  Where the procurement agent is unfamiliar with the culture and language of the supplier, the risks of misunderstanding, miscommunication and offensive/awkward encounters significantly increases.
- **Transportation**
  Whereas domestic sourcing necessitates the use of a single mode of transportation, global sourcing frequently includes multiple modes of transport
- **Methods of payment**
  In global sourcing, a letter of credit is used for payment, which necessitates the cooperation of the banks of the supplier and buyer.

2.4 Development and management of suppliers

Supplier development

Supplier development is the process of working with certain suppliers on a one-to-one basis to improve their performance for the benefit of the buying organization.

What Is Supplier Development?

Supplier development is defined by the Chartered Institute of Procurement & Supply as ―the process of working with certain suppliers on a one-to-one basis to improve their performance and expand capabilities for the benefit of the buying organization.‖ Supplier development can come in many different forms, from informal initiatives to a formally structured program.

Why Invest in a Supplier Development Program?

The supplier diversity industry offers many success stories of why investing in supplier development is essential for supplier diversity programs. Through focusing on supplier development, organizations are able to generate many mutually beneficial opportunities, including:

- Expanding the competitive landscape (pricing, service levels, and offerings) between the organization‘s existing and potential vendors
- Promoting innovation and ―out-of-the-box‖ thought leadership through the entrance of new products, services, and solutions in the business
- Growing the sources and channels from which to procure products and services
- Creating a collaborative environment between suppliers that may see themselves as competitors, when in fact their solutions may be complementary, allowing them to team up on business opportunities on which they could not normally bid
- Showcasing the organization‘s commitment to the economic growth of the communities in which they operate
- Driving job creation
- Building the capacity of diverse businesses to not only serve the organization more effectively but also increasing their sustainability in the entire marketplace

- Increasing the organization's customer satisfaction, whether it be B2B or B2C
- Integrating supplier diversity into the strategic sourcing process, which will drive corporate-supplier-diversity goal achievement
- Increasing visibility and awareness of executive management to key diverse suppliers
- Fostering engagement of management executives across all parts of the organization.

2.5 Buying a business legal aspects and considerations

Buying a business Legal Aspects and Considerations purchasing an on-going business is an excellent opportunity for an entrepreneur seeking the financial and personal rewards of owning and operating a business. Buying vs. Starting a Business. A chief advantage of purchasing a business (as opposed to starting one "from scratch") is the opportunity to acquire goodwill.

Preliminary Negotiations:

The early stages of any business acquisition will entail some preliminary negotiations between the proposed buyer and seller. It is this stage where the parties will begin to explore the broad issues and characteristics of the transaction such as price, payment terms, and the legal structure of the sale (e.g. stock sale, asset sale, etc.). The parties typically converse and may exchange correspondence as well as other informal documents. It is here where the parties may unwittingly encounter their first legal land mine. There is a subtle difference between negotiation and words that give rise to a binding contract. Letters of Intent In some cases, a letter of intent (LOI) can facilitate negotiations.

2.6.1 Cost management negotiating for purchasing

Negotiation in the purchasing process covers the period from when the first communication is made between the purchasing buyer and the supplier through to the final signing of the contract. Negotiation can be as simple as trying to obtain a discount on a case of safety gloves through to the complexities of major capital purchases. A purchasing professional must aim to be successful in their negotiations with suppliers to obtain the best price with the best conditions for every item that is purchased.

Smaller Supplier Base and Long-Term Contracts:

The negotiation process has become a more important sector in the supply chain process as companies look to reduce their expenditure whilst increasing their purchasing power. This means that purchasing professionals have to negotiate increasingly better rates with suppliers whilst maintaining or increasing quality and service.

Vendors Are Partners:

The emphasis in negotiation moved away from lowest price scenario to negotiating with fewer vendors to obtain the lowest price with the best service, quality, and conditions. The aim for companies were to reduce overall spends rather than negotiate the lowest price with a large number of vendors, which did not give the best overall result.

Negotiation or RFQ:

Non-government purchasing departments continue to offer a range of prequalified vendors a request for quotation (RFQ) for items or services that it wishes to purchase. The competitive bid process can produce a range of bids and conditions that the purchasing department will evaluate and then award the business. This may or may not involve some form of negotiation.

Negotiation Objectives:

Purchasing staff should enter all negotiations with clearly defined objectives. Without having objectives, the possibility for the purchasing professional to concede on price, quality or service is significantly raised. The negotiator should enter into discussions with the vendor with precise objectives that they wish to achieve for their company.

2.6.2 SUBCONTRACTING:

Subcontracting is the practice of assigning part of the obligations and tasks under a contract to another party known as a subcontractor. Subcontracting is especially prevalent in areas where complex projects are the norm, such as construction and information technology.

BREAKING DOWN 'Subcontracting'

Subcontracting is very useful in situations where the range of required capabilities for a project is too diverse to be possessed by a single general contractor. In such cases, subcontracting parts of the project that do not form the general contractor's core competencies may assist in keeping costs under control and mitigate overall project risk.

2.7 Purchasing insurance:

Purchasing insurance - overview:

We all have different reasons for purchasing insurance. We also make different decisions about our insurance at different times in our lives. Whatever your reason, you have many options available to help protect your lifestyle and the things you value from the risks that concern you most.

Before you purchase a policy

Before you buy an insurance, policy make sure you:

- Consider what things you might wish to insure, and the risks you may face
- Familiarize yourself with the range of products and providers available
- Determine if you are already covered
- Ask questions. When comparing policies, ask insurers about the features you need, and any exclusions or applicable excesses
- Understand the value of the item you are insuring and the financial impact of paying for the you are insuring against
- Consider any additional cover you may need
- Check cover limits

2.8.1 Evaluation of purchase performance:

A simple yet effective method of evaluation a business purchasing performance is to assess the savings made by the department as the business grows. The economy of scale states a larger production should bring savings throughout the production process, including the cost of raw materials and services.

True Cost:

Assessing the cost of the products acquired by a purchasing department is the most basic evaluation method available to a manager. However, buying cheaper products is not always a useful measure of performance. If raw materials do not meet quality standards or services do not meet expectations, they are costly to a company whatever their original price. If you calculate the true cost of services and raw materials by assessing related costs, such as returns, higher transportation costs, complaints and liability claims, you will get a more accurate view of your purchasing performance.

Savings:

A simple yet effective method of evaluation a business purchasing performance is to assess the savings made by the department as the business grows. The economy of scale states a larger production should bring savings throughout the production process, including the cost of raw materials and services.

Inventory Flow:

The price you pay for a product is not always a reflection of the performance of a purchasing department. Some raw materials, such as steel and gas, fluctuate due to market forces, which are out of the control of purchasing executives. Another method to evaluate their efficiency is to measure the turnover rate of your stock.

Transportation:

Although a purchasing department may not always have control over the price of products, the cost and quality of transportation is something efficient purchasing departments can negotiate with providers. If your assessment shows little or no progress in the quality and savings in transportation despite entering into large contracts with providers, you may want to look closer into your purchasing negotiation methods.

2.8.2 Inventory management:

Inventory management is the supervision of non-capitalized assets (inventory) and stock items. A component of supply chain management, inventory management supervises the flow of goods from manufacturers to warehouses and from these facilities to point of sale. In any business or organization, all functions are interlinked and connected to each other and are often overlapping.

Defining Inventory:

Inventory is an idle stock of physical goods that contain economic value, and are held in various forms by an organization in its custody awaiting packing, processing, transformation, use or sale in a future point of time.

From the above definition, the following points stand out with reference to inventory:

- All organizations engaged in production or sale of products hold inventory in one form or other.
- Inventory can be in complete state or incomplete state.
- Inventory is held to facilitate future consumption, sale or further processing/value addition.
- All inventoried resources have economic value and can be considered as assets of the organization.

Different Types of Inventory:

Inventory of materials occurs at various stages and departments of an organization. A manufacturing organization holds inventory of raw materials and consumables required for production. It also holds inventory of semi-finished goods at various stages in the plant with various departments.

Besides Raw materials and finished goods, organizations also hold inventories of spare parts to service the products. Defective products, defective parts and scrap also form a part of inventory as long as these items are inventoried in the books of the company and have economic value.

Types of Inventory by Function

INPUT	PROCESS	OUTPUT
Raw Materials	Work in Process	Finished Goods
Consumables required for processing. Eg: Fuel, Stationary, Bolts & Nuts etc. required in manufacturing	Semi-Finished Production in various stages, lying with various departments like Production, WIP Stores, QC, Final Assembly, Paint Shop, Packing, Outbound Store etc.	Finished Goods at Distribution Centres throughout Supply Chain
Maintenance Items/Consumables	Production Waste and Scrap	Finished Goods in transit
Packing Materials	Rejections and Defectives	Finished Goods with Stockiest and Dealers
Local purchased Items required for production		Spare Parts Stocks & Bought Out items
		Defectives, Rejects and Sales Returns
		Repaired Stock and Parts
		Sales Promotion & Sample Stocks

Let us look at the benefits of this model for both Dell as well as Its Suppliers:

- With VMI model, Dell has reduced its inbound supply chain and thereby gets to reduce its logistics and inventory management costs considerably.

- DELL gets to postpone owning inventory until at the time of actual consumption. Thereby with no inventories DELL has no need for working capital to be invested into holding inventories.
- DELL does not have to set up inventory operations and employ teams for operations as well as management of inventory functions.

Supplier Benefits:

- Supplier gets to establish better relationship and collaboration with DELL with longterm business prospect.
- By agreeing to hold inventories and effect JIT supplies at the door to DELL, supplier will be in a better position to bargain and get more business from DELL.
- With VMI model, supplier gets an opportunity to engage in better value proposition with his customer DELL.
- Supplier gets confirmed forecast for the entire year with commitments from DELL for the quantity off take.
- VMI managed is managed by 3PL and supplier does not have to engage himself in having to set up and manage inventory operations at DELL‘s premise.
- 3PL Managed VMI holds inventories of all suppliers thereby charges each supplier on per pallet basis or per sq. ft basis. Supplier thereby gets to pay on transaction basis without having to marry fixed costs of inventory operations.

Today most of the Multi-National companies have successfully managed to get their suppliers and 3PL service providers to setup VMI throughout their plants all over the world and this model has become the order of the day.

Need for inventory management:

1. Meet variation in Production Demand

Production plan changes in response to the sales, estimates, orders and stocking patterns. Accordingly, the demand for raw material supply for production varies with the product plan in terms of specific SKU as well as batch quantities.

Holding inventories at a nearby warehouse helps issue the required quantity and item to production just in time.

2. Cater to Cyclical and Seasonal Demand

Market demand and supplies are seasonal depending upon various factors like seasons; festivals etc and past sales data help companies to anticipate a huge surge of demand in the market well in advance. Accordingly, they stock up raw materials and hold inventories to be able to increase production and rush supplies to the market to meet the increased demand.

3. Economies of Scale in Procurement

Buying raw materials in larger lot and holding inventory is found to be cheaper for the company than buying frequent small lots. In such cases one buys in bulk and holds inventories at the plant warehouse.

4. Take advantage of Price Increase and Quantity Discounts

If there is a price increase expected few months down the line due to changes in demand and supply in the national or international market, impact of taxes and budgets etc., the companies tend to buy raw materials in advance and hold stocks as a hedge against increased costs.

Companies resort to buying in bulk and holding raw material inventories to take advantage of the quantity discounts offered by the supplier. In such cases the savings on account of the discount enjoyed would be substantially higher that of inventory carrying cost.

5. Reduce Transit Cost and Transit Times

In case of raw materials being imported from a foreign country or from a far away vendor within the country, one can save a lot in terms of transportation cost buy buying in bulk and transporting as a container load or a full truck load. Part shipments can be costlier.

6. Long Lead and High demand items need to be held in Inventory

Often raw material supplies from vendors have long lead running into several months. Coupled with this if the particular item is in high demand and short supply one can expect disruption of supplies. In such cases it is safer to hold inventories and have control.

Finished goods inventory

All Manufacturing and Marketing Companies hold Finished Goods inventories in various locations and all through FG Supply Chain..

Why and when do Organizations hold Finished Goods Inventories?

1. Markets and Supply Chain Design

Organizations carry out detailed analysis of the markets both at national as well as international / global levels and work out the Supply Chain strategy with the help of SCM strategists as to the ideal location for setting up production facilities, the network of and number of warehouses required to reach products to the markets within and outside the country as well as the mode of transportation, inventory holding plan, transit times and order management lead times etc, keeping in mind the most important parameter being, to achieve Customer Satisfaction and Demand Fulfilment.

2. Production Strategy necessitates Inventory holding

The blue print of the entire Production strategy is dependent upon the marketing strategy. Accordingly, organizations produce based on marketing orders. The production is planned based on Build to stock or Build to Order strategies.

3. Market penetration

Marketing departments of companies frequently run branding and sales promotion campaigns to increase brand awareness and demand generation. Aggressive market penetration strategy depends upon ready availability of inventory of all products at nearest warehousing location so that product can be made available at short notice - in terms of number of hours lead time, at all sales locations throughout the state and city.

4. Market Size, location and supply design

Supply chain design takes into account the location of market, market size, demand pattern and the transit lead time required to reach stocks to the market and determine optimum inventory holding locations and network to be able to hold inventories at national, regional and local levels and achieve two major objectives.

5. Transportation and Physical Barriers

Market location and the physical terrain of the market coupled with the local trucking and transportation network often demand inventory holding at nearest locations. Hilly regions for example may require longer lead-time to service. All kinds of vehicles may not be available and one may have to hire dedicated containerized vehicles of huge capacities. In such cases the will have to have an inventory holding plan for such markets.

6. Local tax and other Govt. Rules

In many countries where GST is not implemented, regional state tax rules apply and vary from state to state. Accordingly, while one state may offer a tax rebate for a particular set of product category, another state may charge higher local taxes and lower interstate taxes. In such cases the demand for product from the neighbouring state may increase than from the local state. Accordingly inventory holding would have to be planned to cater to the market fluctuation.

7. Production lead times

FG inventory holding becomes necessary in cases where the lead-time for production is long. Sudden market demand or opportunities in such cases require FG inventories to be built up and supplies to be effected.

8. Speculative gain

Companies always keep a watch on the economy, annual state budget, financial environment and international environment and are able to foresee and estimate situations, which can have an impact on their business and sales.

9. Avoid Certain Costs

Finally, organizations hold FG inventories to satisfy customer demand, to reduce sales management and ordering costs, stock out costs and reduce transportation costs and lead times.

2.9 Financial impact of inventory:

Inventory procurement, storage and management is associated with huge costs associated with each these functions.

Inventory costs are basically categorized into three headings:

1. Ordering Cost

2. Carrying Cost

3. Shortage or stock out Cost & Cost of Replenishment

a. Cost of Loss, pilferage, shrinkage and obsolescence etc.

b. Cost of Logistics

c. Sales Discounts, Volume discounts and other related costs.

1. **Ordering Cost:**

Cost of procurement and inbound logistics costs form a part of Ordering Cost.

2. **Carrying Cost:**

Inventory storage and maintenance involves various types of costs namely:

- Inventory Storage Cost
- Cost of Capital

Inventory carrying involves Inventory storage and management either using in house facilities or external warehouses owned and managed by third party vendors.

I) Inventory Storage Cost:

Inventory storage costs typically include Cost of Building Rental and facility maintenance and related costs. Cost of Material Handling equipment, IT Hardware and applications, including cost of purchase, depreciation or rental or lease as the case may be.

II) Cost of Capital:

Includes the costs of investments, interest on working capital, taxes on inventory paid, insurance costs and other costs associate with legal liabilities.

The inventory storage costs as well as cost of capital independent upon and varies with the decision of the management to manage inventory in house or through outsourced vendors and third-party service providers.

UNIT III

Manufacturing scheduling – manufacturing flow systems – work flow automation – flexibility in manufacturing to achieve dynamic optimization. Material handling system design and decision warehousing, storekeeping – strategies of warehousing and storekeeping space management.

3.1 Manufacturing scheduling

In the manufacturing world, production planning and control features four stages: Routing, Scheduling, Dispatching, and Follow Up. The first two relate to production planning while the second two relate to control. Planning and scheduling are directly associated with time management, a major factor in enhancing shop floor efficiency and the second stage of production planning and control (PPC). Knowing this, let‘s focus on the scheduling stage specifically and the different methods used to approach it: master production scheduling and manufacturing and operation scheduling.

- Forward scheduling is planning the tasks from the date resources become available to determine the shipping date or the due date.
- Backward scheduling is planning the tasks from the due date or required-by date to determine the start date and/or any changes in capacity required.

The benefits of production scheduling include:

- Process change-over reduction
- Inventory reduction, levelling
- Reduced scheduling effort
- Increased production efficiency
- Labour load leveling
- Accurate delivery date quotes
- Real time information

Key concepts in scheduling:

A key character of scheduling is the productivity, the relation between quantity of inputs and quantity of output. Key concepts here are:

- Inputs: Inputs are plant, labor, materials, tooling, energy and a clean environment.

- Outputs: Outputs are the products produced in factories either for other factories or for the end buyer. The extent to which any one product is produced within any one factory is governed by transaction cost.
- Output within the factory: The output of any one work area within the factory is an input to the next work area in that factory according to the manufacturing process. For example, the output of cutting is an input to the bending room.
- Output for the next factory: By way of example, the output of a paper mill is an input to a print factory. The output of a petrochemicals plant is an input to an asphalt plant, a cosmetics factory and a plastics factory.
- Output for the end buyer: Factory output goes to the consumer via a service business such as a retailer or an asphalt paving company.
- Resource allocation: Resource allocation is assigning inputs to produce output. The aim is to maximize output with given inputs or to minimize quantity of inputs to produce required output.

Batch production scheduling:

Background:

Scheduling in the batch processing environment:

A batch process can be described in terms of a recipe which comprises a bill of materials and operating instructions which describe how to make the product. The ISA S88 batch process control standard provides a framework for describing a batch process recipe. The standard provides a procedural hierarchy for a recipe.

SCHEDULING:

Scheduling fixes a time and date to each operation and outlines the commencement and completion time-frame for each process. Both subsequent stages of PPC depend on this timeline which makes it a very valuable asset in the production process. Scheduling looks to optimize the use of time; from each piece of work involved to project planning to customer delivery. The goal is to eliminate idle machines and laborers while enhancing efficiency.

Master Production Scheduling:

Master Production Scheduling (MPS), otherwise known as an over-all schedule, focuses on a specific time period. It includes a plan for the production of individual commodities such as staffing, inventory, etc for the allotted time period.

Manufacturing and Operation Scheduling:

Different from MPS, this type of scheduling focuses around the production of uniform products of the same size, color, and design in mass quantities. Found within a manufacturing process that produces the same products regularly, manufacturing and operation scheduling is easily prepared for manufacturers that fit the above criteria. However, the system flounders where variables arise in production and there are multiple permutations of a single product.

THE TAKEAWAY:

From these two options, we can infer that MPS offers a more effective solution for operations managers industry wide. The process delivers a manufacturing plan that targets the needs of customers and the capabilities of the entire manufacturing organization. Other benefits include:

- Smoothing the customer demand signal by decoupling it from the manufacturing process
- Projecting accurate lead time and future deliveries
- Enabling the supply chain to communicate priorities and requirements effectively thanks to a fixed schedule- stabilizing overall production

3.2 Manufacturing flow system

This strategy is typically applied in discrete manufacturing as an attempt to handle production volumes comprising discrete units of product in a flow which is more naturally found in process manufacturing. The basic fact is that in most cases, discrete units of a solid product cannot be handled in the same way as continuous quantities of liquid, gas or powder. Discrete manufacturing is more likely to be performed in batches of product units that are routed from process to process in the factory. Each process may add value to the batch during a run-time or work-time. There is usually some time spent waiting for the process during a queue-time or wait-time. The larger the batch, the longer each unit has to wait for the rest of the batch to be completed, before it can go forward to the next process. This queue-time is waste, Muda (Japanese term), and represents time lost that is not value-added in the eyes of the customer. This waste is one of the most important elements targeted for reduction and elimination in lean manufacturing.

3.3 Workflow automation:

Workflow automation is an easy way to streamline manual and paper-based processes often comprised of unstructured tasks involving people, processes, and content. Workflow and Content Automation (WCA) represents the consolidation of traditional workflow and content generation into a new category to support the needs of a digital business. It‘s about improving processes – from the everyday to the elaborate.

Benefits of Workflow Automation:

In order to stay competitive and grow, a business must optimize its processes to minimize inefficiencies, preserve resources and ultimately increase revenue. Today I want to highlight how Workflow Automation can improve your business process and deliver benefits to your entire organization.

Business Workflow Automation is a concept that transforms existing business activities, roles and tasks from legacy and manual systems into a centralized, automated structure. Actions, such as approvals, requests, assignments and claims, once handled manually and on paper, can now be executed digitally and through an organized workflow.

1. **Reducing Errors** - The Right Workflow Automation solution will eliminate all manual and human error that would otherwise cost precious time and resources to address. The system will notify late actions, non-approvals, overlooked tasks and more.

2. **Improved Communication** – Employees no longer need to manually notify each other when a process is complete or moves from one role to another. Notifications and status updates keep all team members involved and informed.

3. **Employee Success** – A Workflow Automation Platform should set employees up for success. Eliminating repetitive and manual processes motivates employees and allows them to focus on more important tasks which, in turn, can boost morale and enhance product innovation.

4. **Reduce Costs** – The cost associated with human error and time-to-market is significantly reduced if not eliminated altogether. Overall, a streamlined process will optimize use of valuable time and resources.

5. **Visibility and Status** – Management visibility and internal status reporting is made easy when a workflow is automated correctly. Employee approval

hierarchy and accountability can now be clearly stated for all to see. This eliminates finger-pointing and promotes complete transparency.

6. **Scalability** – When mundane and manual tasks are automated, resources open up for an organization's ability to grow. With the right Workflow Automation solution, a company can eliminate bottlenecks and meet new demands.

7. **Organization** – Notifications play an important role in keeping all tasks organized and in view. These notifications can be set through easily identifiable email, text message and platform pop-ups and can replace unorganized post-it notes, white board jotting and employee memory error.

8. **Integration** – With the right platform, an Automated Workflow can integrate 3rd party Seas applications, ERP systems, and legacy databases where applicable. Now, all disparate data and systems can play appropriate roles in one process.

9. **Real-Time Reports** – Real-Time insight and reporting available to management can improve the decision-making process and help an organization learn from inefficiencies.

3.4 FLEXIBILITY IN MANUFACTURING TO ACHIEVE DYNAMIC OPTIMISATION

Flexible manufacturing systems (FMS)-Introduction

In the middle of the 1960s, market competition became more intense. During 1960 to 1970 cost was the primary concern. Later quality became a priority. As the market became more and more complex, speed of delivery became something customer also needed.

1. **Flexibility concept. Different approaches**

Today flexibility means to produce reasonably priced customized products of high quality that can be quickly delivered to customers. Different approaches to flexibility and their meanings are shown Table 1.

Table 1

Approach	Flexibility meaning
Manufacturing	• The capability of producing different parts without major retooling • A measure of how fast the company converts its process (es) from making an old line of products to produce a new product • The ability to change a production schedule, to modify a part, or to handle multiple parts
Operational	The ability to efficiently produce highly customized and unique products
Customer	The ability to exploit various dimension of speed of delivery
Strategic	The ability of a company to offer a wide variety of products to its customers
Capacity	The ability to rapidly increase or decrease production levels or to shift capacity quickly from one product or service to another

So, what is flexibility in manufacturing?

While variations abound in what specifically constitutes flexibility, there is a general consensus about the core elements. There are three levels of manufacturing flexibility.

(a) Basic flexibilities

- Machine flexibility - the ease with which a machine can process various operations
- Material handling flexibility - a measure of the ease with which different part types can be transported and properly positioned at the various machine tools in a system
- Operation flexibility - a measure of the ease with which alternative operation sequences can be used for processing a part type

(b) System flexibilities

- Volume flexibility - a measure of a system‘s capability to be operated profitably at different volumes of the existing part types
- Expansion flexibility - the ability to build a system and expand it incrementally
- Routing flexibility - a measure of the alternative paths that a part can effectively follow through a system for a given process plan
- Process flexibility - a measure of the volume of the set of part types that a system can produce without incurring any setup
- Product flexibility - the volume of the set of part types that can be manufactured in a system with minor setup

(c) Aggregate flexibilities

- Program flexibility - the ability of a system to run for reasonably long periods without external intervention
- Production flexibility - the volume of the set of part types that a system can produce without major investment in capital equipment
- Market flexibility - the ability of a system to efficiently adapt to changing market conditions

2. **Seeking benefits on flexibility**

Today‘s manufacturing strategy is to seek benefits from flexibility. This is only feasible when a production system is under complete control of FMS technology. Having in mind the Process- Product Matrix you may realize that for an industry it is possible to reach for high flexibility by making innovative technical and organizational efforts. See the Volvo‘s process structure that makes cars on movable pallets, rather than an assembly line. The process gains in flexibility. Also, the Volvo system has more flexibility because it uses multi-skill operators who are not paced by a mechanical line.

3. **FMS- an example of technology and an alternative layout**

The idea of an FMS was proposed in England (1960s) under the name "System 24", a flexible machining system that could operate without human operators 24 hours a day under computer control. From the beginning the emphasis was on automation rather than the "reorganization of workflow".

Different FMSs levels:

Flexible Manufacturing Module (FMM). Example: a NC machine, a pallet changer and a part buffer; Flexible Manufacturing (Assembly) Cell (F(M/A) C). Example: Four

FMMs and an AGV (automated guided vehicle); Flexible Manufacturing Group (FMG). Example: Two FMCs, a FMM and two AGVs which will transport parts from a Part Loading area, through machines, to a Part Unloading Area; Flexible Production Systems (FPS).

Example: A FMG and a FAC, two AGVs, an Automated Tool Storage, and an Automated Part/assembly Storage; Flexible Manufacturing Line (FML). Example: multiple stations in a line layout and AGVs.

4. **Advantages and disadvantages of FMSs implementation**

Advantages

- Faster, lower- cost changes from one part to another which will improve capital utilization
- Lower direct labour cost, due to the reduction in number of workers
- Reduced inventory, due to the planning and programming precision
- Consistent and better quality, due to the automated control
- Lower cost/unit of output, due to the greater productivity using the same number of workers
- Savings from the indirect labour, from reduced errors, rework, repairs and rejects **Disadvantages**
- Limited ability to adapt to changes in product or product mix (ex. machines are of limited capacity and the tooling necessary for products, even of the same family, is not always feasible in a given FMS)

- Substantial pre-planning activity
- Expensive, costing millions of dollars
- Technological problems of exact component positioning and precise timing necessary to process a component
- Sophisticated manufacturing systems

FMSs complexity and cost are reasons for their slow acceptance by industry. In most of the cases FMCs are favoured.

Flexible manufacturing system:

A flexible manufacturing system (FMS) is a manufacturing system in which there is some amount of flexibility that allows the system to react in case of changes, whether predicted or unpredicted. This flexibility is generally considered to fall into two categories, which both contain numerous subcategories.

The first category, machine flexibility, covers the system's ability to be changed to produce new product types, and ability to change the order of operations executed on a part. The second category is called routing flexibility, which consists of the ability to use multiple machines to perform the same operation on a part, as well as the system's ability to absorb large-scale changes, such as in volume, capacity, or capability.

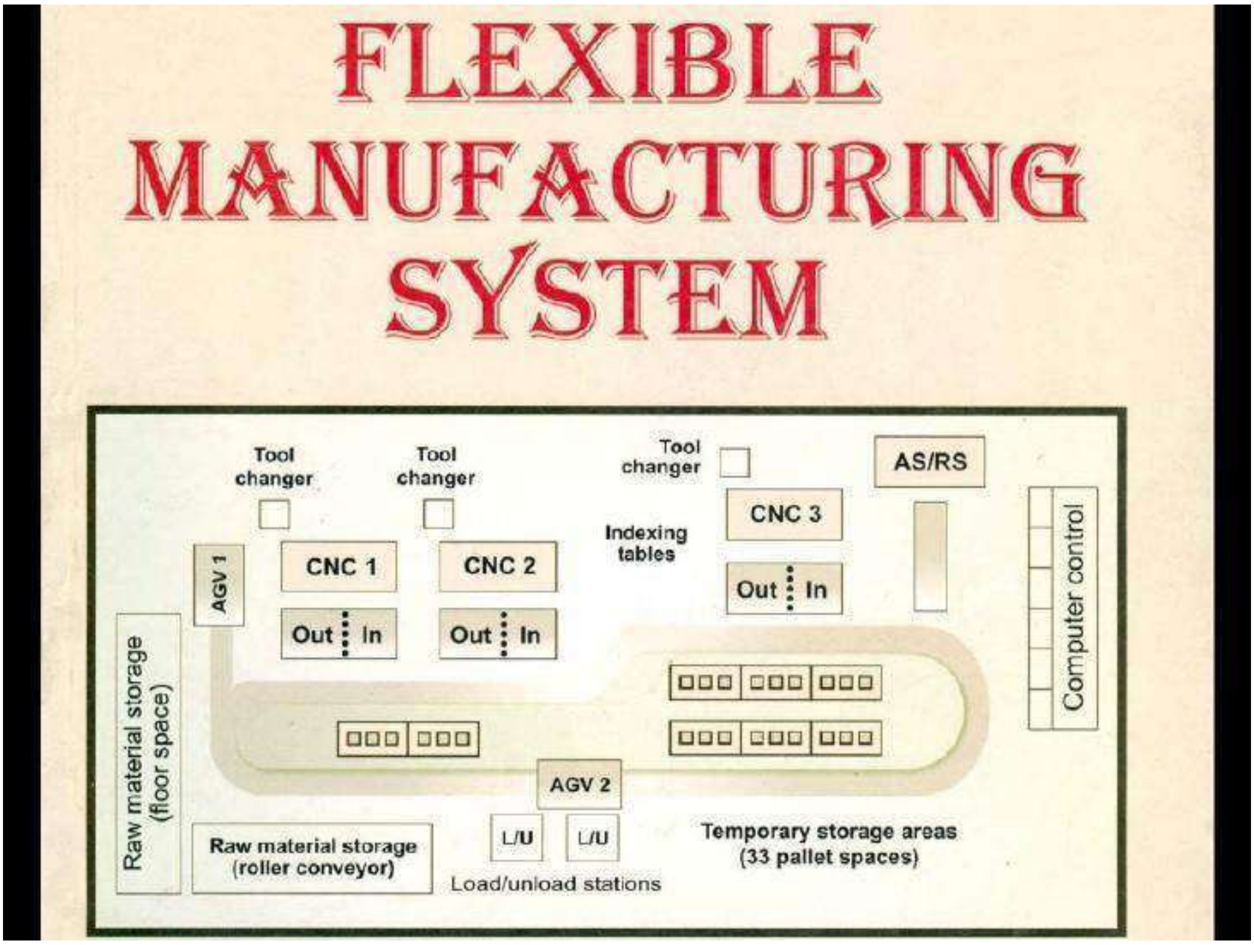


Fig No: 5 Flexible Manufacturing System (FMS)

Industrial Flexible Manufacturing System (FMS)

An Industrial Flexible Manufacturing System (FMS) consists of robots, Computer controlled Machines, Numerical controlled machines (CNC), instrumentation devices, computers, sensors, and other stand-alone systems such as inspection machines.

Fig No:6CNC Machine

3.5.1 Material handling:

Raw materials form a critical part of manufacturing as well as service organization. In any organization, a considerable amount of material handling is done in one form or the other. This movement is either done manually or through an automated process.

Material Handling

Manual material handling ranges from movement of raw material, work in progress, finished goods, rejected, scraps, packing material, etc. These materials are of different shape and sizes as well as weight. Material handling is a systematic and scientific method of moving, packing and storing of material in appropriate and suitable location. The main objectives of material handling are as follows:

- It should be able determine appropriate distance to be covered.
- Facilitate the reduction in material damage as to improve quality.
- Reducing overall manufacturing time by designing efficient material movement
- Improve material flow control
- Creation and encouragement of safe and hazard-free work condition
- Improve productivity and efficiency
- Better utilization of time and equipment
- Design of proper facility layout
- Promotes development of method which improves and simplifies the work process
- It improves overall production activity.

- Efficient material handling reduces total cost of production.

Principles of Material Handling

- **Orientation Principle:** It encourages study of all available system relationships before moving towards preliminary planning. The study includes looking at existing methods, problems, etc.
- **Planning Principle:** It establishes a plan which includes basic requirements, desirable alternates and planning for contingency.
- **Systems Principle:** It integrates handling and storage activities, which is cost effective into integrated system design.
- **Unit Load Principle:** Handle product in a unit load as large as possible
- Encourage effective utilization of all the space available
- **Standardization Principle:** It encourages standardization of handling methods and equipment.
- **Ergonomic Principle:** It recognizes human capabilities and limitation by design effective handling equipment.
- **Energy Principle:** It considers consumption of energy during material handling.
- **Ecology Principle:** It encourages minimum impact upon the environment during material handling.
- **Mechanization Principle:** It encourages mechanization of handling process wherever possible as to encourage efficiency.
- **Flexibility Principle:** Encourages of methods and equipment which are possible to utilize in all types of condition.
- **Simplification Principle:** Encourage simplification of methods and process by removing unnecessary movements
- **Gravity Principle:** Encourages usage of gravity principle in movement of goods.
- **Safety Principle:** Encourages provision for safe handling equipment according to safety rules and regulation
- **Computerization Principle:** Encourages of computerization of material handling and storage systems
- **System Flow Principle:** Encourages integration of data flow with physical material flow
- **Layout Principle:** Encourages preparation of operational sequence of all systems available

- **Cost Principle:** Encourages cost benefit analysis of all solutions available
- **Maintenance Principle:** Encourages preparation of plan for preventive maintenance and scheduled repairs
- **Obsolescence Principle:** Encourage preparation of equipment policy as to enjoy appropriate economic advantage.

Material handling operations are designed based upon principles as discussed above.

Material handling equipment consists of cranes, conveyors and industrial trucks.

Material Handling System Design

The problems in an existing MH system will be evident if one can observe one or more of the following symptoms in the system:

- Backtracking in material flow path,
- Built-in hindrances to flow,
- Cluttered aisles,
- Confusion at the dock,
- Disorganized storage,
- Excess scrap,
- Excess handling of individual pieces,
- Excess manual effort,
- Excess walking,
- Failure to use gravity,
- Fragmented operations,
- High indirect labor costs,
- Idle machines,
- Inefficient use of skilled worker,
- Lack of cube storage,
- Lack of parts,
- Lack of supplies,
- Long hauls,
- Material piled up on the floor,
- No standardization,
- Overcrowding Poor housekeeping,
- Poor inventory control,

- Product damage,
- Repetitive handling,
- Service areas not conveniently located,
- Truck delayed or tiled up, Two-person lifting jobs.

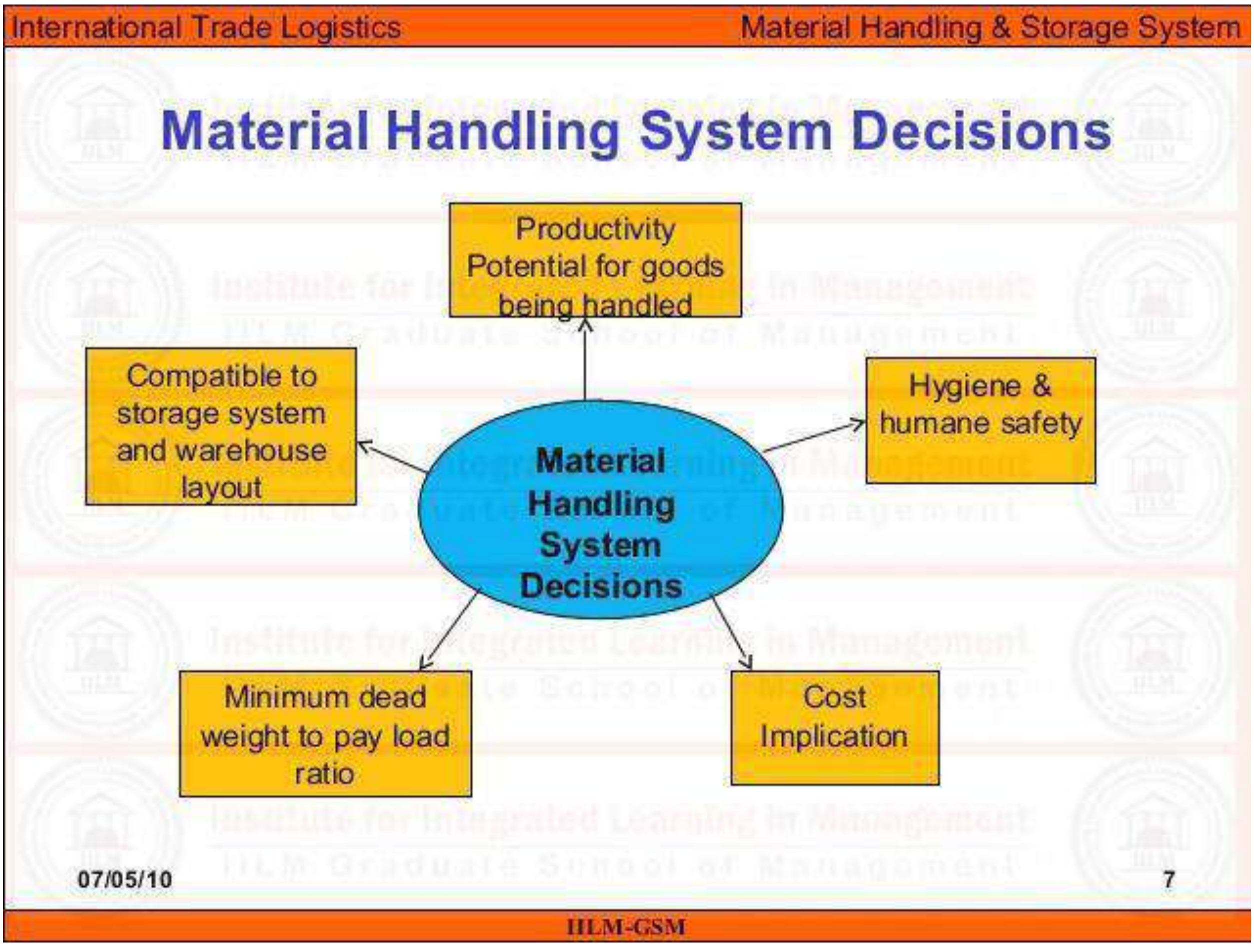


Fig No:7 Material Handling Systems Decisions

3.5.2 Warehouse and materials management

Any damage or theft to the materials is going to increase cost to the organization. So, it becomes important for organization to have a robust and effective warehouse as well as material‘s management.

Scope of Warehouse Management:

The place where raw material and/or finished goods are stored is referred to as warehouse or store. Generally, warehouse is structure or building design keeping in mind raw material and finished goods it is going to store. Therefore, warehouse management should be able to:

- Receive the purchase goods and entered upon the stock register.
- Inventory Accounting of raw material, work-in-progress or finished goods.
- Preservation of the inventory
- Ability to access goods whenever called upon.
- Appropriate record keeping through coding as to preserve goods and reduce obsolescence.
- Proper stocking of goods as ensure smooth handling.

If above objectives are met, warehouse management significantly increases the overall efficiency of the production and organization. A robust warehouse management would ensure that:

- A smooth flow of production
- Appropriate layout management to reduce material handling and equipment handling
- Reduce to wastage as well as spoilage
- Eliminate the possibility of theft and damage
- Ensure preservation of environment and reduce pollution.
- Encourage cost reduction and driving efficiency.

Warehouse Design

Warehouse design is art in which goods and material can be stored as to reduce wastage, cost of carrying and increase safety. The various factors considered for warehouse design are as follows:

- Easy material handling including receipt, dispatch and storage.
- Easy supervision of materials as well as personnel
- Reduce and control obsolescence of the goods by following appropriate method.
- Optimum utilization of space

Storage Location:

There are three general ways in which goods are stocked as to reduce material handling and increase prompt access. They are as follows:

- Fixed position in which specific area is located where designated goods are stored. If the designated goods are not there, that space will remain empty. Fixed position encourages easy and traceable access to the goods.
- Random Storage in which goods are stored where ever space is available. Here maximum utilization of the space is achieved.
- Categorized fixed location in which particular set of products are placed randomly in the allotted space.

Material Management:

Material management is a sub-set of warehouse management dealing exclusively material which contribute the maximum to completion of the end product. The objectives of material management are as follows:

- Lower the price of the raw materials.
- Reduce the cost of production and ensure the smooth flow of production.
- Maintain quality of raw material as well as finished goods.
- Maintain good relation with the supplier as to ensure a smooth flow of raw materials.
- Continuous improvement of the skill set of the workers thereby increasing overall efficiency within the organization.

Decision warehousing:

Decision Warehouse is a tool of the Rule Execution Server console for monitoring ruleset execution. It stores execution traces in a database.

3.5.3 Storekeeping:

Meaning:

After the completion of purchase procedure, the next important aspect of materials management is storekeeping.

A storehouse is a building provided for preserving materials, stores and finished goods. The in-charge of store is called storekeeper or stores manager. The organisation of the stores department depends upon the size and layout of the factory, nature of the materials stored and frequency of purchases and issue of materials.

Types:

Stores may be centralized or decentralized. Centralized storage means a single store for the whole organization, whereas decentralized storage means independent small stores attached to various departments. Centralized storekeeping ensures better layout and control of stores, economical use of storage space, lesser staff, saving in storage costs and appointment of experts for handling storage problems.

Objectives of storekeeping:

Following are the main objectives of an efficient system of storekeeping:

- **i.** To ensure uninterrupted supply of materials and stores without delay to various production and service departments of the organisation.
- **ii.** To prevent overstocking and under stocking of materials,
- **iii.** To protect materials from pilferage, theft fire and other risks.
- **iv.** To minimize the storage costs.
- **v.** To ensure proper and continuous control over materials.
- **vi.** To ensure most effective utilization of available storage space and workers engaged in the process of storekeeping.

Functions of Storekeeping:

In the light of above objects, the functions performed by the stores department are outlined below:

- **i.** Issuing purchase requisitions to Purchase Department as and when necessity for materials in stores arises.
- **ii.** Receiving purchased materials from the purchase department and to confirm their quality and quantity with the purchase order.
- **iii.** Storing and preserving materials at proper and convenient places so that items could be easily located.
- **iv.** Storing the materials in such a manner so as to minimize the occurrence of risks and to prevent losses due to defective storage handling.
- **v.** Issuing materials to various departments against material requisition slips duly authorized by the respective departmental heads.

vi. Undertaking a proper system of inventory control, taking up physical inventory of all stores at periodical intervals and also to maintain proper records of inventory.

vii. Providing full information about the availability of materials and goods etc., whenever so necessary by maintaining proper stores records with the help of bin cards and stores ledger etc.

Working of the stores:

There are four sections in the process of storekeeping viz.

(a) Receiving section,

(b) Storage section,

(c) Accounting section, and

(d) Issue section.

These are explained as under:

a) Receiving Section:

There are four kinds of inventories received by stores viz.,

(i) Raw materials,

(ii) Stores and supplies,

(iii) Tools and equipment,

(iv) Work-in- progress or semi-finished goods.

Following procedure is followed in receiving these inventories:

(i) Receiving these incoming materials in stores.

(ii) Checking and inspection of these incoming materials and stores etc.

(iii) Recording the incoming materials in goods received book.

(iv) Preparing and forwarding goods inwards note to purchasing section.

(v) Informing the purchase department about damaged and defective goods and surplus or deficit supplies etc. along with rejection forms and notes.

(vi) Returning damaged or defective goods to the suppliers in accordance with the instructions of the purchase department.

(vii) Forwarding the materials to respective stores and locations where these are to be stored or preserved.

b) Storage Section:

The store room should be located at a convenient and appropriate place. It should have ample facilities to store the materials properly viz. bins, racks and shelves etc. There can be a single store room in case of a small organization, but a large-scale concern can have different or multiple stock rooms in addition to general or main store.

c) Accounting Section:

This section is concerned with keeping proper records with regard to receipt and issue of materials. The primary task of this section is to undertake the process of inventory control.

d) Issue Section:

The materials should be issued to respective departments on receiving duly authorized requisition slips. An entry should be made immediately on the bin card attached with the bin from where the material has been issued.

3.6 Strategies of warehousing and store keeping space management

Warehouse Strategy

20 warehouse strategies to help you to reduce warehouse costs, trim your cost per order, increase capacity without expansion, and improve service levels in your warehouse or distribution centre

1. Benchmarking

A program to set up internal benchmarks will reduce your cost per order or hold the cost in line as volumes increase. Translate these down to department and initial work standards. Contact us if we can help you with an independent internal benchmarking study.

2. **Manage the labor force**

Labor is the largest controllable expense item in your distribution center. Successful practices to improve performance can lower your labor cost.

3. **Hiring, retention and attrition (turnover)**

Labor is your first or second largest expense after outbound freight in the fulfillment center. Review the reasons attrition is so high and work to close the gap. Review your hiring, retention and training practices. How well are you able to staff for the peaks?

4. **Reduce handling and touches**

The fewer touches of product, the less cost of shipping an order. An effective warehouse cost reduction strategy is to streamline the operation and apply industry best practices in order to reduce the handling and cost of fulfilling an order.

5. **Slotting:**

Effective slotting practices can lower your costs for picking, replenishment, and put away warehouse labor.

6. **Team building:**

Successful organizations take team building seriously. Take your organization to a new level and improve productivity.

7. **Picking options:**

How can you use best practices to improve picking productivity?

8. **Use what you have more productively**

This is a mantra in fulfilment today. Our operational assessments will help you get more productivity from your layout, space/product storage utilization and staff. By not caring for the basics of fulfilment,

9. **Performance reporting**

The old adage of, "You can't improve what you don't measure" is certainly true. An effective measurement and reporting process can improve performance and lower costs.

10. **Packing options .**

How can industry best practices help you improve performance and reduce costs of one of the most labor-intensive functions in the warehouse?

11. Freight management

Controlling inbound and outbound freight can make the difference between a profit or loss for your business. Learn more about freight cost reduction.

12. Use proper levels of quantities

Are you ―over inspecting‖ activities to the point of diminishing returns and spending money that does not result in a return on the investment?

13. Receiving practices and cross docking

Cross docking is an effective practice to reduce handling and costs while improving customer service and shipping costs.

14. Process returns more efficiently

Returns cost more than orders to process. Untimely processing of customer credits, refunds and exchanges can damage customer service. Our assessments look at use of staff, people, space and systems to improve productivity.

15. Workforce software

Many companies are still using Excel for their staffing software. Excel cannot save you as much money year over year as a good workforce program. Team up with your Contact Center to share a scheduling system. It will pay for itself quickly. If you have one, understand how to use it to its maximum.

16. Outsourcing option

There are practical and cost-effective reasons to outsource part or all of your business. It may be to deal with a peak, new product categories or when fulfillment is not a company core competency.

17. Finding the right level of automation and systems

ROI analysis could put automation into your planning for cost improvement. The wrong material handling equipment can be creating hidden lost time and inefficient product flow, impacting cost and customer service.

18. Warehouse management/bar code systems

This should include reviewing how bar coding throughout the warehouse, conveyance, material handling and warehouse management systems can improve productivity, increase service levels and reduce costs. See more Warehouse Management Systems Implementation Strategies.

19. Inventory management in the warehouse

Effective inventory management is the single most important tool to improve customer service and reduce cost of operation. See more Inventory Management Cost Savings Strategies.

20. Replenishment practices

Effective replenishment is the basis of successful order fulfillment. Inefficient replenishment will cost huge dollars and negatively impact customer service.

Space Management:

Simply stated, Space Management involves the management of a company‘s physical space inventory. Every organization manages their space one way or another—whether it is through an automated space management system or with a pen and paper.

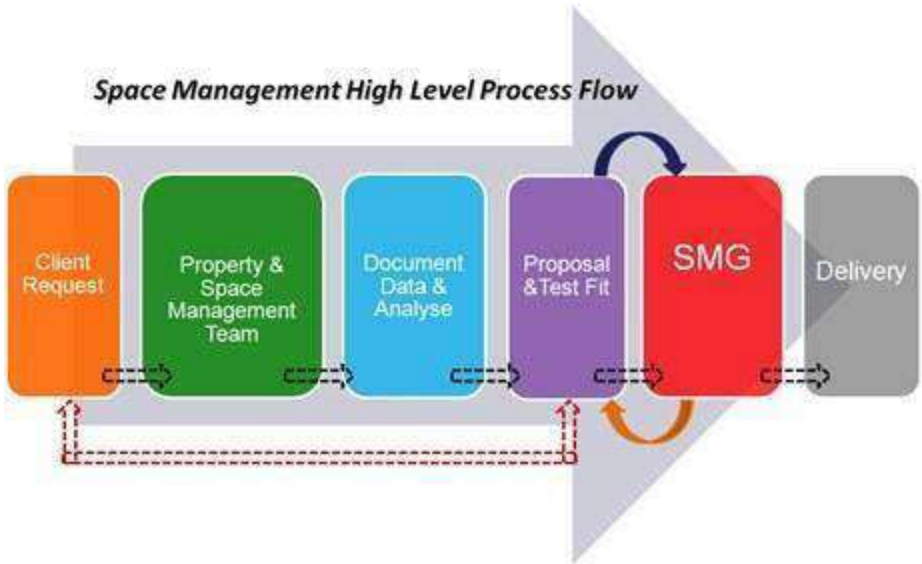


Fig No:8 Space Management-Process Flow

UNIT IV

Logistics management – Role of logistics in SCM – integrated logistics management – transportation design and decision multimodal's – Third Party logistics Services and providers – facilities management (Port / Airport / ICD's) channels of distribution logistics and customer service.

4.1 Logistics management

Logistics management is a supply chain management component that is used to meet customer demands through the planning, control and implementation of the effective movement and storage of related information, goods and services from origin to destination.

What is Logistics and Supply Chain Management?

"Logistics typically refers to activities that occur within the boundaries of a single organization and Supply Chain refers to networks of companies that work together and coordinate their actions to deliver a product to market. Also, traditional logistics focuses its attention on activities such as procurement, distribution, maintenance, and inventory management.

Inbound and Outbound Logistics

"Inbound Logistics refers to movement of goods and raw materials from suppliers to your company. In contrast, Outbound Logistics refers to movement of finished goods from your company to customers"

To illustrate this term, we make a small graphic as below, As you can see, purchasing and warehouse function communicates with suppliers and sometimes called "supplier facing function". Production planning and inventory control function is the centre point of this chart.

Customer service and transport function communicates with customers and sometimes called

"customer facing functions.

- Lack of technology to integrate supply chain processes
- The increase in operating complexities

"Supply Chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer" - from Logistics and Supply Chain Management by Martin Christopher

. So, the people are led to believe that SCM is a "function" which it's not.

Supply Chain is actually a "network" consists of many players asbelow, A generic supply chain structure is as simple as Supplier, Manufacturer, Wholesaler and

Retailer (it's more complex in the real world but a simple illustration serves the purpose).

The word "management" can be explained briefly as "planning, implementing, controlling". Supply Chain Management is then the planning, implementing and controlling of the networks.

Information Musts Flow:

Another important attribute of supply chain management is the flow of material, information and finance (money). Even though there are 3 types of flow, the most important one is information flow aka information sharing. Let's see the example of this through the simplified version of bullwhip effect as below,

Coordination is Essential:

Information sharing requires a certain degree of "coordination" (it's also referred to as collaboration or integration in scholarly articles). Do you wonder when people started working together as a supply chain network? In 1984, companies in the apparel business worked together to reduce overall lead-time. In 1995, companies in automotive industry used Electronic Data Interchange to share information. So, working as a "chain" is the real world practice.

Avoid Conflicting Objectives:

Working as a supply chain network requires the same objective, but this is often not the case (even with someone in the same company). "Conflicting Objectives" is the term used to describe the situation when each function wants something that won't go well together. For example, purchasing people always place the orders to the cheapest vendors (with a very long lead-time) but production people need material more quickly.

Balance Cost/Service:

The concept of Cost/Service Trade-off appeared as early as in 1985 but it seems that people really don't get it.

When you want to improve service, cost goes up. When you want to cut cost, service suffers. It's like a "seesaw", the best way you can do is to try to balance both sides.

Foster Long-term Relationship:

To work as the same "supply chain team", long-term relationship is a key. Otherwise, you're just a separate company with a different strategy / agenda. So, academia keeps preaching about the importance of relationship building, but is not for everyone.

Logistics:

(Definition) Logistics is the art and science of obtaining, producing and distributing material and product in the proper place and in proper quantities. This involves management of:

- Order processing
- Warehousing
- Transportation
- Materials handling
- Packaging

All of this should be integrated through a network of facilities.

- Logistics adds value to the supply chain process if inventory is strategically positioned to achieve sales. But the cost of creating this value is high.
- The largest contributor to logistics cost is transportation: the movement of raw materials to a processing plant, parts to a manufacturer, and finished goods to wholesalers, retailers and customers.
- Supply chain management is logistics taken to a higher level of sophistication. —– Douglas Long.
- Inventory and Forecasting must be considered when designing and managing an effective, efficient system for moving goods quickly from place to place.

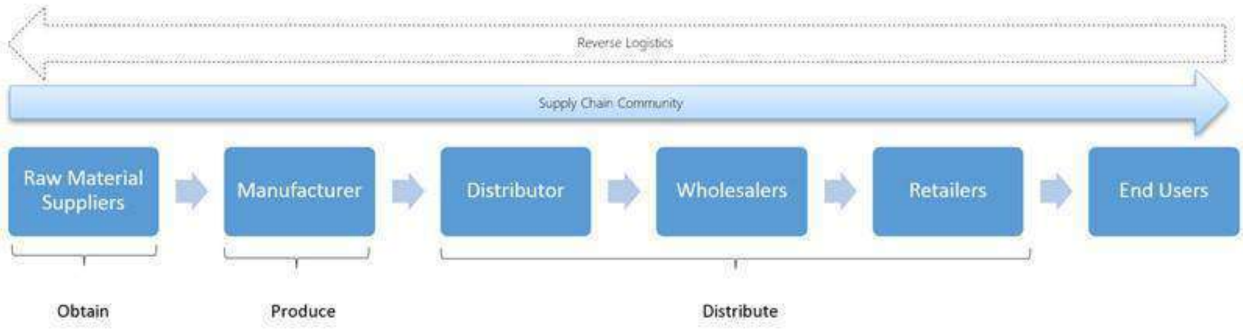


Fig No:9 Logistics Management

Logistics Value Proposition:

- Being able to match key customer expectations and requirements to your firm‘s operating competency level and customer commitment is the essential ingredient in optimizing the value of logistics.
- The value stems from your ability to know exactly how to balance logistics costs against the appropriate level of customer services for each of your key customers.
- If you keep in mind that logistics must be managed as an integrated effort to achieve customer satisfaction at the lowest total cost, then it makes sense that the following are the key elements in this proposition:

Service

- Technology isn‘t the limiting factor for logistics for most companies – it‘s the economics.
- The key is to determine how to outperform competitors in a cost-effective manner.

Cost Minimization

- The second element of the value proposition, cost minimization, should be interpreted as the total cost of logistics in order to be accurate.
- (Definition) Total cost concept of logistics is the idea that all logistical decisions that provide equal service levels should favor the option that minimizes the total of all logistical costs and not be used on cost reductions in one area alone, such as lower transportation charges.
- Today‘s leading supply chain companies develop functional cost analysis and activity-based costing activities that accurately measure the total cost of logistics. The goal now is for logistics to be cost-effective as determined by a

cost-benefit analysis, taking into account how logistical service failure would impact a customer‘s business.

Logistics Goals & Strategies:

At the highest level, logistics shares the goal of supply chain management: ―to meet customer requirements.‖

- There are a number of logistics goals that most experts agree upon: Respond rapidly to changes in the market or customer orders.
- Minimize variances in logistics service.
- Minimize inventory to reduce costs.
- Consolidate product movement by grouping shipments.
- Maintain high quality and engage in continuous improvement.
- Support the entire product life cycle and the reverse logistics supply chain.
- An effective logistics strategy depends upon the following tactics:
- Coordinating functions (transportation management, warehousing, packaging, etc.) to create maximum value for the customer.
- Integrating the supply chain. o Substituting information for inventory.
- Reducing supply chain partners to an effective minimum number. Pooling risks.

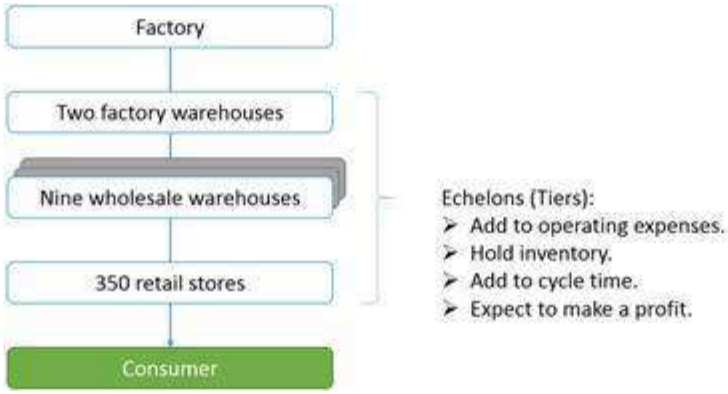
Coordinating Functions:

- Logistics can be viewed as a system made up of interlocking, independent parts. From this perspective, improving any part of the system must be done with full awareness of the effects on other parts of the system.
- You need a cross-functional approach in logistics, just as you do in supply chain management as a whole. Teams that cross functions are also very likely to cross company boundaries in a world of international supply chains with different firms focused on different functions.
- The overall goal of logistics management is not better shipping or more efficient location of warehouses but more value in the supply network as measured by customer satisfaction, return to shareholders, etc.

Integrating the Supply Chain:

- Integrating the supply chain requires taking a series of steps when constructing the logistics network. In a dynamic system, steps may be taken out of order and retaken continuously in pursuit of quality improvements:

- Locate in the right countries Develop an effective export-import strategy Select warehouse locations Select transportation modes and carriers Select the right number of partners Develop state of the art information systems
- You have to watch out for tradeoffs in effectiveness when reducing the number of logistics partners, you can generally increase efficiency by doing so.
- If possible, look for an entire echelon you can do without.



- The more partners there are in the chain, the more difficult and expensive the chain is to manage.
- Handoffs among partners cost money and eat up time.
- Having many partners means carrying more inventory.
- Reducing the number of partners can reduce operating costs, cycle time, and inventory holding costs.
- There is however some lower limit below which you create more problems than you solve.

Pooling Risks:

- (Definition) Risk pooling is a method often associated with the management of inventory risk. Manufacturers and retailers that experience high variability in demand for their products can pool together common inventory components associated with a broad family of products to buffer the overall burden of having to deploy inventory for each discrete product.
- By using a central warehouse to hold parts common to many products, a supply network can reduce storage costs and the risk of stock outs that would be experienced in smaller, decentralized warehouses.

- There are tradeoffs to consider. The central warehouse may be further away from some production facilities than the smaller warehouses would be, lead times and transportation costs are likely to go up in that case.
- Logistics has to be managed from the point of view of improving the value of the overall system, not just one part of the system.

Flow of Goods and Information: The enterprise must have internal process integration and collaboration between functions as well as alignment and integration across the supply chain.

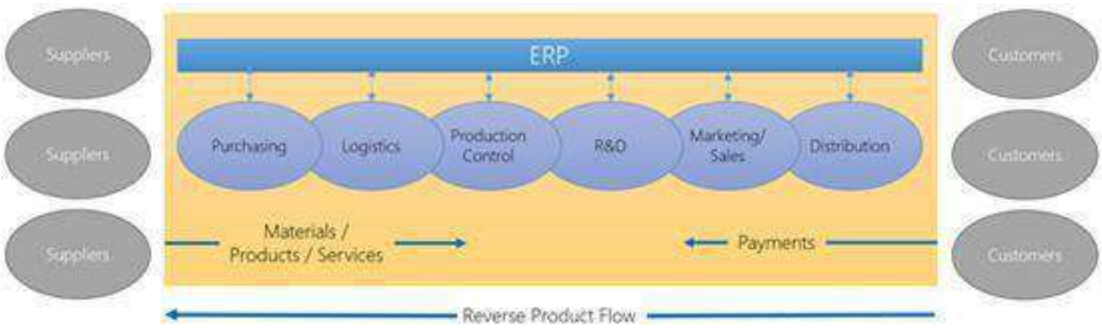


Fig No:10 ERP in SCM

4.2 Role of logistics in SCM:

The supply chain is a vital part of this process, including transportation, shipping, receiving, storage, and management of all these areas. Within the business sector, logistics can be applied to information, transportation, inventory, warehousing, material handling, and packaging, disposal, and security.

Supply Chain Management (SCM) can be divided into three main areas: purchasing, manufacturing, and transport. From end to end, this includes decisions about which input materials to use, production quantities, inventory levels, distribution network configuration, and transportation for both the input materials as well as for the finished products. Logistics Management is the component of SCM that focuses on how and when to get raw materials, intermediate products, and finished goods from their respective origins to their destinations.

Today, international trade is commonplace and increasing market share in emerging markets is highly desirable. It is therefore safe to say goods are rarely consumed where they are produced, and transportation services are the essential trait union between all of the elements of the Supply Chain. Effective, cost efficient Logistics Management can be a real point of competitive differentiation. But how does a company achieve this?

To practice effective, cost efficient Logistics Management, an organization must lay the foundation for a responsive, economical transportation network. With a responsive, economical transportation network, an organization is able to implement major strategic changes to reduce costs and increase customer service levels with very little disruption to the overall supply chain flow.

A responsive transportation network begins with end-to-end network visibility. Visibility allows the business to centralize production operations to lower-cost areas without impacting customer service levels, because any uncertainty within the network can be monitored and appropriately managed to keep inventory levels as low as possible.

An economical transportation network actually begins with a shift in attitude. Businesses are often trapped in the traditional view that transportation is a necessary evil – an inevitable source of cost and risk. And who can blame them? Transport is by far the largest component of the cost structure of a business‘logistics. According to sector research (Chang, 1998), transport accounts for as much as 30% of the total cost of logistics operations – almost as much as warehousing and Inventory together!

Now consider the impact of transportation activities on the overall economy of a country. The numbers are impressive. In the United States in 2005, freight transport activities accounted for 10% of the GDP. In Germany alone, the Freight Logistics Sector (the largest in Europe) came in third in total revenue (after retail trade and the automotive industry) with a whopping 170 billion Euros, or 7% of the German GDP.

While the data certainly lends itself to the mindset that transportation is a ―cost albatross,‖ if you will, around one‘s neck, this attitude is rapidly changing. In fact, Supply Chain Managers who are outpacing their competition have done so largely by acknowledging transportation as a ready vehicle through which to drive cost savings and create value within the Supply Chain. How? Technology, for one.

Role of Logistics Management Company:

The supply chain is a vital part of this process, including transportation, shipping, receiving, storage, and management of all these areas. Within the business sector, logistics can be applied to information, transportation, inventory, warehousing, material handling, and packaging, disposal, and security.

The success of an organization is greatly dependent on how efficient its Supply Chain Management is. Supply Chain Management involves purchasing, operations, distribution and integration. As Supply chains become more complex, it means dealing with multiple vendors to coordinate, allowing redundancy and inefficiency to creep in easily.

4.3 Integrated Logistics Management

Definition:

It is a technique which utilizes various sources and channels to meet the customer demand in time. First step is to anticipate and forestall the demand the customer. After that the required resource that will be utilized for fulfilling the need are acquired. These resources range from human resource to technology, material, IT resources etc. After that all effort are made to meet the customer demand timely by the active participation of all the resources. It utilizes the various operations like transport, logistics, physical distribution,

Fig No:11 Integrated Logistic Support

4.4 Transportation Design and decision multi-modalism:

Transportation Design:

In the field of transport design, you might find work designing private or commercial automobiles, marine vessels, motorcycles, aircrafts, rockets or mass-transit vehicles. You could also focus on specific areas of transportation design, such as interior design.

Transport design focuses on creating models for vehicles. Also referred to as transportation design, this field provides you with a variety of design, development and engineering employment options.

Decision multi-modalism:

Multimodal transportation is defined as completing the transportation process by using at least two transportation tools to connect and transport together; it is a kind of transportation organization form which uses optimum efficiency as the goal. There are no new transportation channels and tools in the multimodal transportation process; it is a combination of modern organization means and single transportation mode.

4.5 Third party logistics services and providers:

When this integration occurs, the provider is then called a third-party supply chain management provider (3PSCM) or supply chain management service provider (SCMSP). 3PL targets particular functions within supply management, such as warehousing, transportation, or raw material provision.

Logistics Functions:

- The supply chain is about moving or transforming raw materials and ideas into products or services and getting them to customers.
- Logistics is about moving materials or goods from one place to another. Thus, logistics is the servant of design, production and marketing.
- The following areas of logistics management contribute to an integrated approach to logistics within supply chain management:
- Transportation
- Many modes of transportation play a role in the movement of goods through supply chains: air, rail, road, water, and pipeline.
- Warehousing
- (Definition) Warehousing is the activities related to receiving, storing and shipping materials to and from production or distribution locations.

- Third-and fourth-party logistics
- The various logistics functions can be outsourced to firms that specialize in some or all of these services.
- (Definition) A third-party logistics provider (3PL) is an entity that provides product delivery services for a buyer and supplier team. Third-part logistics providers actually perform or manage one or more logistics services.
- (Definition) A fourth-party logistics provider (4PL) is a logistics specialist that plays the role of general contractor by taking over the entire logistics function for an organization and coordinating the combination of divisions or subcontractor‘s necessary to perform the specific tasks involved.
- Reverse logistics (or reverse supply chain)
- This is the area which determines how best to handle the return, reuse, recycling, or disposal of products that make the reverse journey from customer to the supplier.

Types:

Third-party logistics providers include freight forwarders, courier companies, as well as other companies integrating & offering subcontracted logistics and transportation services. Hertz and Alfred son (2003) describe four categories of 3PL provider.

- Standard 3PL Provider: this is the most basic form of a 3PL provider. They would perform activities such as, pick and pack, warehousing, and distribution (business) – the most basic functions of logistics. For a majority of these firms, the 3PL function is not their main activity.
- Service Developer: this type of 3PL provider will offer their customers advanced value-added services such as: tracking and tracing, cross-docking, specific packaging, or providing a unique security system. A solid IT foundation and a focus on economies of scale and scope will enable this type of 3PL provider to perform these types of tasks.
- The Customer Adapter: this type of 3PL provider comes in at the request of the customer and essentially takes over complete control of the company's logistics activities. The 3PL provider improves the logistics dramatically, but does not develop a new service. The customer base for this type of 3PL provider is typically quite small.
- The Customer Developer: this is the highest level that a 3PL provider can attain with respect to its processes and activities. This occurs when the 3PL

- provider integrates itself with the customer and takes over their entire logistics function.

Layers:

First party logistics providers (1PL) are single service providers in a specific geographic area that specialize in certain goods or shipping methods., N. Schröter, I. Schröter, Supply Chain Management and Logistics, Verlag W. Kohlhammer, Stuttgart 2010, Examples are: carrying companies, port operators, depot companies. The logistics department of a producing firm can also be a first party logistics provider if they have own transport assets and warehouses.

Lead logistics providers:

3PL providers without their own assets are called lead logistics providers. Lead logistics providers have the advantage that they have specialized industry expertise combined with low overhead costs, but lower negotiating power and less resources than a third-party provider has, based on a normally big company size, a good customer base and established network systems. 3PL providers may sacrifice efficiency by preferring their own assets in order to maximize their own efficiency. Lead logistics providers may also be less bureaucratic with shorter decision-making cycles due to the smaller size of the company.

Advantages of 3PL

At the beginning the primary advantage of outsourcing logistics activities to a Third-party Logistics (3PL) is focusing on core activities of the business. This means the core activities is much more important than logistics due to the companies have to create on value added activities for making much better revenue, the logistics operations is a beyond activity for each company in delivering the service to the customer. In the other words, the companies have to give the focusing in their main working areas and so, they do not willing to be busy about the logistics activities they believe to outsource their logistics activities to one of the best LSP‘s. This is an improvement and contribution to the quality of service levels in overall performance in the company‘s core activities.

Disadvantages of 3PL

Although there are also disadvantages in hiring Third Party Logistics provider in the selection of the outsourcing at the beginning, it is difficult to realize if it is reliable and cost-effective between the company and the Third-Party

Logistics provider. Every firm has to pay great attention at the selection of their Third-Party Logistics partner; they have really to check if they are able to provide a better service to them. The biggest mistakes have been made because of the insufficient financial position, the companies cannot select the reliable outsourcing providers. It is not easy for identifying the Third Service Provider (3PL) if it is suitable or not, it a complex period. However, to solve this problem are required to clarify the ability of service provider.

4.6.1 Facilities Management:

Facility management (or facilities management or FM) is a professional management discipline focused upon the efficient and effective delivery of support services for the organizations that it serves. It serves to ensure the integration of people, systems, place, process, and technology.

Scope:

FM covers these two main areas: 'Space & Infrastructure' (such as planning, design, workplace, construction, lease, occupancy, maintenance, furniture and cleaning) and 'People & Organization' (such as catering, ICT, HR, accounting, marketing, hospitality).

- communication
- emergency preparedness and business continuity
- environmental stewardship and sustainability
- finance and business
- Hospitality Management
- human factors
- leadership and strategy
- operations and maintenance
- project management
- quality
- real estate and property management technology.

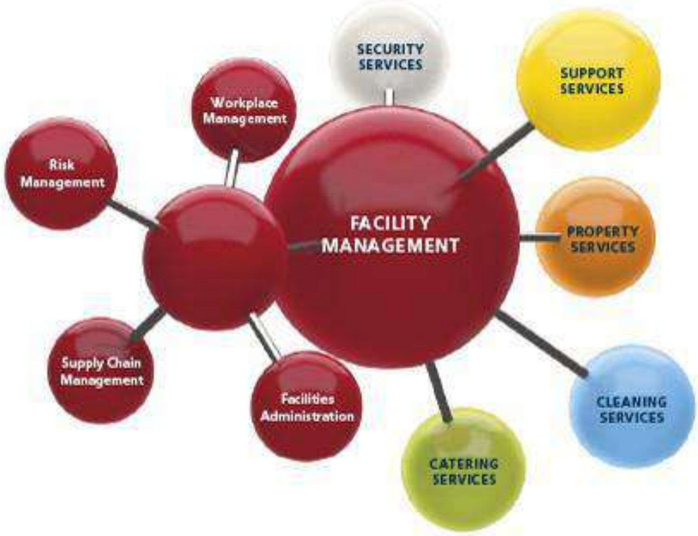


Fig No:12 Facility Management

4.6.2 Channels of distribution logistics and customer service:

Logistics distribution channels:

The logistic distribution is a continuous probability distribution. Its cumulative distribution function is the logistic function, which appears in logistic regression and feed forward neural networks.

The Importance of Distribution:

Most producers use intermediaries to bring their products to market. They try to develop a distribution channel (marketing channel) to do this. A distribution channel is a set of interdependent organizations that help make a product available for use or consumption by the consumer or business user. Channel intermediaries are firms or individuals such as wholesalers, agents, brokers, or retailers who help move a product from the producer to the consumer or business user.

Fig No:13 Distribution Channel

Functions of Distribution Channels:

Distribution channels perform a number of functions that make possible the flow of goods from the producer to the customer. These functions must be handled by someone in the channel. Though the type of organization that performs the different functions can vary from channel to channel, the functions themselves cannot be eliminated. Channels provide time, place, and ownership utility. They make products available when, where, and in the sizes and quantities that customers want.

The Internet in the Distribution Channel:

By using the Internet, even small firms with limited resources can enjoy some of the same competitive advantages as their largest competitors in making their products available to customers internationally at low cost. E-commerce can result in radical changes in distribution strategies. Today most goods are mass-produced, and in most cases end users do not obtain products directly from manufacturers.

Customer service:

Customer service is the provision of service to customers before, during and after a purchase. The perception of success of such interactions is dependent on employees "who can adjust themselves to the personality of the guest". Customer service concerns the priority an organization assigns to customer service relative to components such as product innovation and pricing. In this sense, an organization that values good customer service may spend more money in training employees than the average organization or may proactively interview customers for feedback.

Automated customer service:

Customer service may be provided by a person (e.g., sales and service representative), Examples of automated means are Internet sites. An advantage with automated means is an increased ability to provide service 24-hours a day, which can, at least, be a complement to customer service by persons.

UNIT V

Performance measurement in SCM –meaning-advantages of performance measures-The benefits of performance measurement –measuring SCM-supplier performance measurement –parameters choosing suppliers.

5.1 Information Technology - A Key Driver of SCM

Supply Chain Management is a broad-based function that encompasses all business and operational processes involved in but not limited to Procurement, Manufacturing, and Finished Goods Transportation, warehousing & Distribution and Inventory Management.

In a globalized business scenario characterized by geographically spread markets, raw material procurement sources across the world and cheaper manufacturing and labor markets being available in developing world, the business of meeting demand with supply is constantly changing and evolving.

IT is one of the most important enabler of the Supply chain in complex modern world of Global Businesses.

5.2.1 Electronic Data Interchange (EDI)

What is EDI?

Electronic Data Interchange (EDI) is the electronic interchange of business information using a standardized format; a process which allows one company to send information to another company electronically rather than with paper. Business entities conducting business electronically are called trading partners.

The process improvements that EDI offers are significant and can be dramatic. For example, consider the difference between the traditional paper purchase order and its electronic counterpart.

A Traditional Document Exchange of a Purchase Order	An EDI Document Exchange of a Purchase Order
This process normally takes between three and five days.	This process normally occurs overnight and can take less than an hour.
Buyer makes a buying decision, creates the purchase order and prints it.	Buyer makes a buying decision, creates the purchase order but does not print it.
Buyer mails the purchase order to the supplier.	EDI software creates an electronic version of the purchase order and transmits it automatically to the supplier.
Supplier receives the purchase order and enters it into the order entry system.	Supplier's order entry system receives the purchase order and updates the system immediately on receipt.
Buyer calls supplier to determine if purchase order has been received, or supplier mails buyer acknowledgment of the order.	Supplier's order entry system creates an acknowledgment and transmits it back to confirm receipt.

What is EDI?

Electronic commerce is the communication of business information through the sending and receiving of electronic messages between trading partners. Various types of electronic exchanges fall within this definition of electronic commerce. One form of electronic commerce is Electronic Data Interchange (EDI) which is the computer-tocomputer exchange of business documents between companies, using a public standard format. EDI is a vital tool available to every business which increases efficiency and productivity, and replaces the traditional processes of preparing data in paper form and sending it by mail or by facsimile.

Benefits of Implementing EDI

The benefits available by using EDI are being realized by a large number of companies, many of which transmit a substantial percentage of their transaction volume via EDI. For companies using I/C EDI, UCS or VICS EDI on a volume basis, the realization of available benefits can result in a definite competitive advantage.

Users report benefits in the following major areas:

Reduced Lead Time/Quick Response:

EDI can provide a direct reduction in the ordering/shipping time cycle. This benefit both customer and supplier.

Warehouse Efficiencies:

In addition to the benefits cited above relating to warehouse operations, the following benefits are also being realized in this traditionally high-cost area:

Transaction Handling/Processing Accuracy:

The automated procedures associated with EDI result in a reduction in transaction errors and resulting corrective action, including the following:

Administrative and Clerical Costs:

One of the major goals in creating EDI was to reduce the great volume of business paperwork and many of the clerical tasks involved in handling the processing of paper documents. Many users have realized substantial productivity improvements and/or direct cost savings in their office operations by reducing or eliminating the time required for the following tasks.

EDI Implementation Guidelines:

The Uniform Code Council, Inc. (UCC) manages and administers the

following EDI implementation guidelines. These guidelines are industry specific guidelines of ASC X12 standard

INDUSTRIAL/COMMERCIAL (I/C) EDI– used by providers and users of raw materials, packaging materials and maintenance-repair-operations (MRO) products.

UNIFORM COMMUNICATION STANDARD (UCS)– used primarily by the grocery industry.

VOLUNTARY INTERINDUSTRY COMMERCE STANDARD (VICS) EDI–

- Business-to-Consumer (B2C) e-commerce – this is the term that most people are think of when e-commerce is mentioned. Every day, we experience B2C e-commerce, whether it is booking airline tickets and hotel reservations or buying books, shoes and clothes online.

- Business-to-Business (B2B) e-commerce – as its name implies, B2B e-commerce is the electronic exchange of information between two businesses, rather than between a consumer and a business.

Two types of B2B Integration:

- Integration at the data level –automation of the exchange of business documents between business applications, such as automating the exchange of all the documents in the procureto-pay process.
- Integration at the people level – enabling B2B collaboration between the people in different companies during business processes such as dispute resolution and new vendor registration.

INTEGRATION AT THE DATA LEVEL

For two businesses to tightly integrate at the data level, they need to automate the following tasks:

- Connect electronically – usually via the internet using a secure communications protocol, such as AS2, SFTP, or FTPS
- Exchange data electronically in a format that can be understood by the computer systems at each company – usually via an EDI standard format, which can be immediately understood
- Translate the EDI data to the format of each company‘s in-house system – typically accomplished by using special EDI translator software

Integration at The People Level – Collaboration

Furthermore, they need the information management tools too simply and easily:

- Enable business partners to maintain their own company and contact profiles, thus keeping partner information fresh and up-to-date
- Perform mass communications to appropriate segments of the trading partner base without relying on out-of-date spreadsheets on various employees‘ computers
- Roll out compliance initiatives (e.g., send a 20-question survey to suppliers regarding the greenhouse gas initiative) to all or a subset of your partner community
- Audit business partners‘ compliance with various initiatives.

- Capture, share, and collaborate on performance-related data that helps to rapidly resolve multi-party disputes and discrepancies with full traceability and audit control.

5.2.2 ERF

Internet and Intranet

Supply chain management can be defined as the planning as well as management of all activities that are involved in sourcing as well as procurement, conversion, plus including all logistics management activities.

Procurement:

The Internet reduces the cost of purchases by giving supply-chain partners quick access to information about sources, availability, pricing and technical data. Members of the supply chain must cooperate in making this information available online, possibly in secure folders only accessible to account holders who are supply-chain partners.

Supply:

On the supply side, the most important role of the Internet is to greatly increase the size of the accessible market. Suppliers using the Internet to market their goods and services can sell world-wide.

Direct Transactions:

For supply chains in general, the role of the Internet has been to reduce the power of intermediaries. Suppliers can offer their products and services directly to customers, and purchasers can find what they need directly from producers.

Collaboration:

While supply-chain management through the Internet is still in its infancy, the possibilities exist for even closer integration of supply and procurement functions. Suppliers are interested in having a high, predictable sales volume, while purchasers are looking for a reliable, low-cost source.

Inventory-Management:

Definitely one aspect of supply chains that is most costly is inventory management. And, the internet has made it possible for business firms to quickly set up EDI information programs with their clients. Before the emergence of the internet, EDI will usually take a longer time to be implemented in a supply chain.

Purchasing:

The internet has also made it possible for cost associated with purchasing to be reduced. In the United States, business firms have been able to make use of the internet to streamline the purchasing function. With it there is reduction in paper-flows as well as order cycle times- the time it takes for purchased order to be delivered.

Transportation:

Transport management is probably the most popular use of the internet in supply chains. This is so important for any business since the tracking of shipments to regional depots will provide the firm with data that shows how reliable or otherwise the performance of its carriers is, making it possible for transport managers to confirm whether their motor carriers are meeting the promised arrival time.

Order-processing:

This critical role of order processing is one that the internet has helped to dramatically reduce costs. And, reduction in paperwork is a major item of this cost saving when compared to conventional practices.

Vendor Relationships:

A critical factor when it comes to vendor relations for a business is being able to rate the performance of its vendors. This will be based on elements agreed by both parties (the company and its vendors).

Customer service:

The internet has made it possible for customers to have 24-hour access to a business firm‘s customer service department making it possible for companies to be notified of any problem or service issue.

5.2.3 INTRANET:

An intranet is a private - internal - business network that enables your employees to share information, collaborate, and improve their communications.

In its simplest form an intranet is established with the technologies for local area networks (LANs) and wide area networks (WANs). Intranets began to appear in a range of larger organizations from 1994.

Uses:

Increasingly, intranets are being used to deliver tools, e.g. collaboration (to facilitate working in groups and teleconferencing) or sophisticated corporate directories, sales and customer relationship management tools, project management etc., to advance productivity.

Benefits:

Workforce productivity:

Intranets can help users to locate and view information faster and use applications relevant to their roles and responsibilities. With the help of a web browser interface, users can access data held in any database the organization wants to make available, anytime and — subject to security provisions — from anywhere within the company workstations, increasing the employees ability to perform their jobs faster, more accurately, and with confidence that they have the right information. It also helps to improve the services provided to the users.

Time:

Intranets allow organizations to distribute information to employees on an as needed basis; Employees may link to relevant information at their convenience, rather than being distracted indiscriminately by email.

Communication:

Intranets can serve as powerful tools for communication within an organization, vertically strategic initiatives that have a global reach throughout the organization. The type of information that can easily be conveyed is the purpose of the initiative and what the initiative is aiming to achieve, who is driving the initiative, results achieved to date, and who to speak to for more information. By providing this information on the intranet, staff has the opportunity to keep up-to-date with the strategic focus of the organization.

- Web publishing allows cumbersome corporate knowledge to be maintained and easily accessed throughout the company using hypermedia and Web technologies.

Examples include:. Because each business unit can update the online copy of a document, the most recent version is usually available to employees using the intranet.

Business operations and management:

Intranets are also being used as a platform for developing and deploying applications to support business operations and decisions across the internetworked enterprise.

Cost-effective:

Users can view information and data via web-browser rather than maintaining physical documents such as procedure manuals, internal phone list and requisition forms.

- **Enhance collaboration:**

  Information is easily accessible by all authorized users, which enables teamwork.

- **Cross-platform capability:**

  Standards-compliant web browsers are available for Windows, Mac, and UNIX.

- **Built for one audience:**

  Many companies dictate computer specifications which, in turn, may allow Intranet developers to write applications that only have to work on one browser (no cross-browser compatibility issues).

Promote common corporate culture:

Every user has the ability to view the same information within the Intranet.

Immediate updates:

When dealing with the public in any capacity, laws, specifications, and parameters can change. Intranets make it possible to provide your audience with "live" changes so they are kept up-to-date, which can limit a company's liability.

Supports a distributed computing architecture: The intranet can also be linked to a company's management information system, for example a time keeping system.

5.2.4 E-Commerce:

E-Commerce is the electronic trade with goods and services. E-Commerce means an electronic integration of processes across companies using information- and communication technologies in order to eliminate media disruptions

1.Introduction

As computer networks and communication technology is developing rapidly, especially in the popularization and application of the Internet, social economy is experiencing a great change. As the inevitable product of the network economy, ecommerce set off a revolution in the economic field, the human way of thinking and life have had a profound impact. process of supply chain management to improve supply chain performance levels. In this paper, e-commerce and supply chain management issues related to a preliminary study.

2. Relationships between E-Commerce and Supply Chain Management

Concepts of E-Commerce and Supply Chain Management as the Internet's Rapid Development Has Created a Web-Based Information-Trading Way

1. To help companies establish sales network around the world;

2. To provide enterprises with information and data of various business activities, production and sales information to solve the difficult problem of collection;

3. To reduce market entry link that help companies open up the market to minimize the circulation of goods;

4. To reduce business cost of sales and minimize the transaction costs of goods;

5. Both for trading and online commodity trading to facilitate negotiations;

6. To provide the most reliable quality assurance;

7. To provide customers the most convenient means for retrieval. Supply Chain Management .

ROLE OF E-COMMERCE IN SCM

E-commerce will give businesses more flexibility in managing the increasingly complex movement of products and information between businesses, their suppliers and customers.

Customer Orientation

E-commerce will help companies deliver better services to the customers, and lower their operating costs. E-commerce makes it easier for customer to do business with the companies.

Online shipping enquiry:

This gives instant shipping information access to anyone in the company, from any location. A customer‘s transportation costs and performance can be analyzed, thus helping the customer negotiate rates and improved services.

Benefits of e-commerce

- Banks and their collateral managers can exercise better control over the execution of the transactions they fund, an important factor when financing trade in commodities.
- All concerned, including the bankers, can see the progress of the goods and, therefore, the progress of the transaction.
- Shipping documents are prepared, issued and transmitted more quickly, resulting in earlier payment. · Turnover is faster, meaning more business within the same amount of working capital, or a reduction of the working capital required.
- Costs are lower: less interest, no errors, no lost or late documents, no arguments, no waiting for shipping documents.
- Sellers have better control. So, do importers and roasters, who can trace both coffee and documents.
- In some consuming countries, special arrangements permit coffee to be cleared through customs ahead of arrival, resulting in direct dispatch from ship to final destination.

5.2.5 Advanced Planning System:

Advanced planning and Scheduling:

Advanced Planning and Scheduling (APS) is a system of techniques that deal with analysis and planning of logistics and manufacturing during short, intermediate, and long-term time periods.

The five main components of APS systems

- demand planning,
- production planning,
- production scheduling,
- distribution planning, and,
- transportation planning.

5.2.6 Bar Codes - The Easy way for SCM efficiency

Introduction

With the advent of liberalization and globalization of the Indian economy since the last decade, working to global standards and matching them has become a necessity for the Indian industry. All over the developed world work is done by minimum number of people and in an efficient manner without errors.

BARCODE-Technology:

Barcodes are used to capture data quickly and accurately into a computer. Used properly, barcodes can replace or enhance paper based tracking and data collection. In today‘s fast, paced business world bar coding is becoming a necessity, not an option. Any company‘s future may soon depend upon the implementation of such a system.

A high-tech material tracking system enhances employee productivity:

This system integrates bar codes and a sophisticated customized software package that enables users to monitor and manage material movement within warehouses, manufacturing, distribution and utility facilities in real time. These systems are modular and can be used for receiving, storage, picking and transporting and inventory control

Employee time and attendance systems:

This is successfully deployed at various offices and manufacturing facilities. The system uses a bar code swipe reader with inbuilt memory, which is placed at the entrance and transfers the time and attendance data on-line or off-line to the main computer system of the complex. Customized software package is used to integrate the system with the existing computer network to provide instant reports like late coming, early leaving.

Capital asset management:

Normally this task is carried out manually leading to delays, errors and ultimately to mismatch between actual stocks and book stocks. Barcodes offer the best and most convenient solution for accurate and online data handling of all assets along with their present location.

Library automation solution:

A fully barcode integrated Library Management Software can provide not only Issue/Return through barcodes but also the stocktaking and dynamic location tagging can be done through barcodes. This provides complete control over library functions. Bar codes assist in easy and efficient tracking of books while reducing data errors. An important feature of the software is its On Line Public Access Catalogue (OPAC)

5.6.7 Telecommunications network:

Telecommunications network, electronic system of links and switches, and the controls that govern their operation, that allows for data transfer and exchange among multiple users. When several users of telecommunications media wish to communicate with one another, they must be organized into some form of network. In theory, each user can be given a direct point-to-point link to all the other users in what is known as a fully connected topology (similar to the connections employed in the earliest days of telephony),

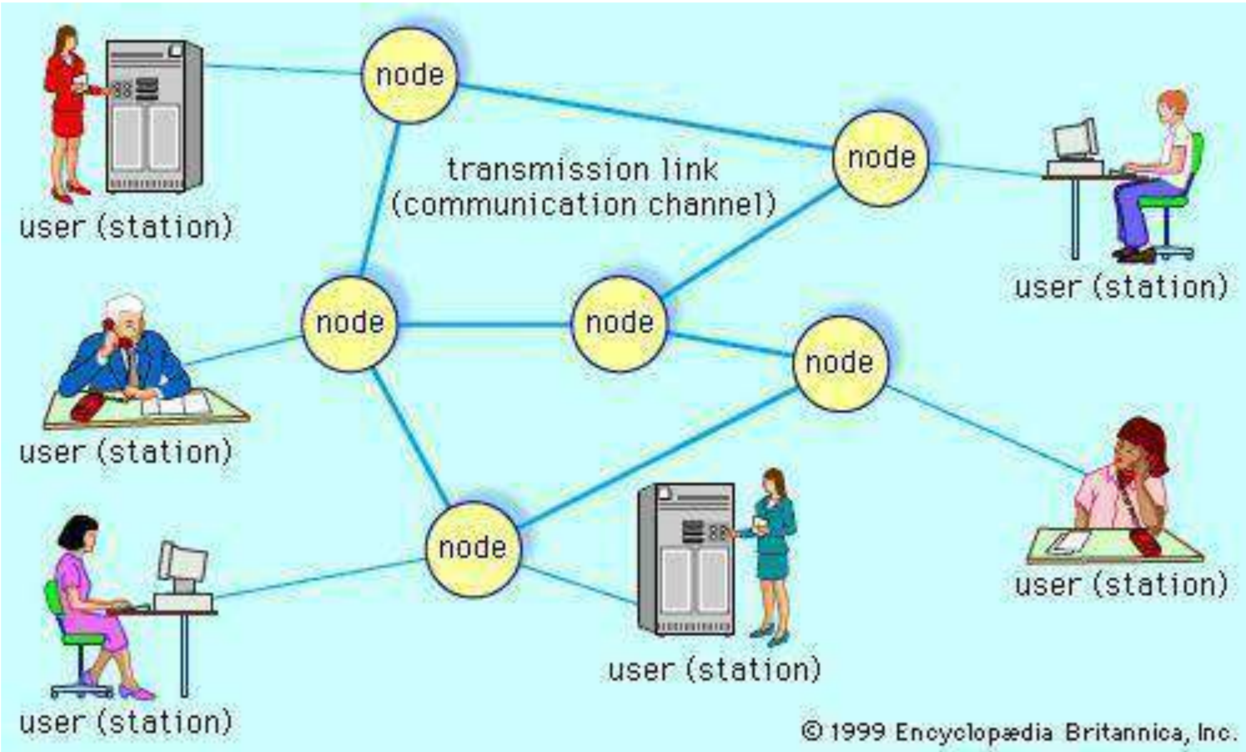


Fig No:14 Telecommunication Network

Types of Networks

Switched communications network:

A switched communications network transfers data from source to destination through a series of network nodes. Switching can be done in one of two ways. In a circuit-switched network, a dedicated physical path is established through the network and is held for as long as communication is necessary. An example of this type of network is the traditional (analog) telephone system.

Broadcast network:

A broadcast network avoids the complex routing procedures of a switched network by ensuring that each node‘s transmissions are received by all other nodes in the network. Therefore, a broadcast network has only a single communications channel. A wired local area network (LAN), for example, may be set up as a broadcast network, with one user connected to each node and the nodes typically arranged in a bus, ring, or star topology, as shown in the figure

Network Access:

Since all nodes can hear each transmission in a broadcast network, a procedure must be established for allocating a communications channel to the node or nodes that have packets to transmit and at the same time preventing destructive interference from collisions (simultaneous transmissions)..

Scheduled access:

In a scheduling method known as time-division multiple accesses (TDMA), a time slot is assigned in turn to each node, which uses the slot if it has something to transmit. If some nodes are much busier than others, then TDMA can be inefficient, since no data are passed during time slots allocated to silent nodes

Random access:

Scheduled access schemes have several disadvantages, including the large overhead required for the reservation, polling, and token passing processes and the possibility of long idle periods when only a few nodes are transmitting. This can lead to extensive delays in routing information, especially when heavy traffic occurs in different parts of the network at different times—a characteristic of many practical communications networks

Carrier Sense Multiple Access:

One random-access method that reduces the chance of collisions is called carrier sense multiple access (CSMA). In this method, a node listens to the channel first and delays transmitting when it senses that the channel is busy. Because of delays in channel propagation and node processing, it is possible that a node will erroneously sense a busy channel to be idle and will cause a collision if it transmits. In CSMA, however, the transmitting nodes will recognize that a collision has occurred: the respective destinations will not acknowledge receipt of a valid packet. Each node then waits a random time before sending again (hopefully preventing a second collision). This method is commonly employed in packet networks with radio links, such as the system used by amateur radio operators

Spread-spectrum multiple accesses:

Since collisions are so detrimental to network performance, methods have been developed to allow multiple transmissions on a broadcast network without necessarily causing mutual packet destruction. One of the most successful is called spread-spectrum multiple access (SSMA). In SSMA simultaneous transmissions will cause only a slight increase in bit error probability for each user if the channel is not too heavily loaded.

Open Systems Interconnection:

Different communication requirements necessitate different network solutions, and these different network protocols can create significant problems of compatibility when networks are interconnected with one another

Data recognition and use:

The application layer is difficult to generalize, since its content is specific to each user. For example, distributed databases used in the banking and airline industries require several access and security issues to be solved at this level. Network transparency (making the physical distribution of resources irrelevant to the human user) also is handled at this level. The presentation layer, on the other hand, performs functions that are requested sufficiently often that a general solution is warranted. These functions are often placed in a software library that is accessible by several users running different applications

Data transfer:

The network layer breaks data into packets and determines how the packets are routed within the network, which nodes (if any) will check packets for errors along the route, and whether congestion control is needed in a heavily loaded network. The data-link layer transforms a raw communications channel into a line that appears essentially free of transmission errors to the network layer.

5.6.8 Video conference and artificial intelligence:

DEFINITION of 'Video Conferencing'

A technology that allows users in different locations to hold face-to-face meetings without having to move to a single location. This technology is particularly convenient for business users in different cities or even different countries because it saves the time, expense and hassle associated with business travel. Uses for video conferencing include holding routine meetings, negotiating business deals and interviewing job candidates.

BREAKING DOWN 'Video Conferencing'

Video conferencing main advantage over teleconferencing is that users can see each other, which allows them to develop stronger relationships. When a video conference is held for informal purposes, it is called a video call or video chat.

A virtual office is a business location that exists only in cyberspace. A virtual office setup allows business owners and employees to work from any location by using technology such as laptop computers, cell phones and internet access.

5.6.9 Artificial Intelligence:

What is Artificial Intelligence?

According to the father of Artificial Intelligence, John McCarthy, it is ―The science and engineering of making intelligent machines, especially intelligent computer programs‖.

Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.

AI is accomplished by studying how human brain thinks and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

Philosophy of AI

While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, ―Can a machine think and behave like humans do?‖ Thus, the development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.

Goals of AI

- To Create Expert Systems − the systems which exhibit intelligent behaviour, learn, demonstrate, explain, and advice its users.
- To Implement Human Intelligence in Machines − Creating systems that understand,

  think, learn, and behave like humans.

What Contributes to AI?

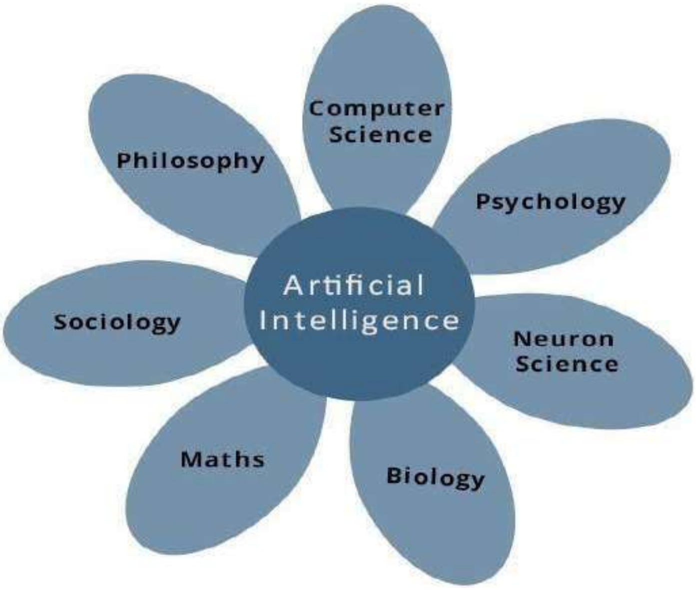


Fig No:15 Artificial Intelligence

Programming Without and with AI:

The programming without and with AI is different in following ways –

Programming Without AI	Programming With AI
A computer program without AI can answer the specific questions it is meant to solve.	A computer program with AI can answer the generic questions it is meant to solve.
Modification in the program leads to change in its structure.	AI programs can absorb new modifications by putting highly independent pieces of information together. Hence you can modify even a minute piece of information of program without affecting its structure.
Modification is not quick and easy. It may lead to affecting the program adversely.	Quick and Easy program modification.

Applications of AI:

AI has been dominant in various fields such as −

- Gaming − AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.
- Natural Language Processing − It is possible to interact with the computer that understands natural language spoken by humans.
- Expert Systems − There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.
- Vision Systems − these systems understand, interpret, and comprehend visual input on the computer. For example, oA spying aero plane takes photographs, which are used to figure out spatial information or map of the areas.

Doctors use clinical expert system to diagnose the patient. Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.

- Speech Recognition − Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talk to it. It can handle different accents, slang words, noise in the background, change in human‘s noise due to cold, etc.
- Handwriting Recognition − The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.
- Intelligent Robots − Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

5.7 Best practice in supply chain management:

1) Begin with your customers

The goal of a supply chain is to deliver products or services to customers when and where they are needed. An enlightened supply chain manager understands the needs and service requirements of the organization‗s customers. A strong supply chain always collaborates directly with its customers on the forecasting of demand, replenishing of supplies, and on the development of innovative products, services and business processes

2) Engage senior management

You need to ask yourself, ―Does SCM have a seat at the senior management table?‖ If not, you need to engage senior management in the important role that SCM can play in achieving your organization‗s strategic objectives. While the trend has been positive in recent years, many CEOs still view SCM as a ―cost

3) Manage and recruit SCM talent

Many supply chain best practices are well known, but how you implement them requires talented people. Importantly, there is a real shortage of talented SCM professionals available. As an expert from Rutgers‗Center for Supply Chain Management points out, ―We get lots of resumes but few that are exceptional.‖ Top management must take a leadership role in the acquisition and development of highly skilled supply chain professionals.

4) Build your supply chain with intelligence

Today‗s supply chains are very complex and quite large in scope. In order to be efficient and effective in managing these supply chains, one must implement a world class Enterprise Resource Planning (ERP) system to support its information flows

5) Optimize your IT network

Some of the most strategic SCM issues are where plants and warehouses should be located, how big they should be, and how to get the right balance between costs and service. While it is a very complex problem, software is available to solve this dilemma. Based on the authors‗ personal experience, implementing this strategy has the potential to dramatically reduce costs and improve customer service.

6) Outsource non-core functions and processes

Whether we like it or not, the trend of outsourcing and off shoring is here to stay. While it always has to be addressed strategically, outsourcing has to be considered, particularly for non-core functions or processes

7) Manage risk

As businesses continue to expand globally, increased outsourcing and off-shoring, and practicing lean manufacturing techniques (with minimal inventories), drastically increases risks. It is extremely important to manage these risks and implement plans to mitigate major exposures where possible.

8) Establish key performance indicators/metrics

It goes without saying that you can‘t expect to improve what you don‘t measure. It is critical that SCM has a robust set of metrics or key performance indicators (KPIs) that drive the right behavior. Too many times we see too many metrics that are not driving the right behavior or, worse; no one is paying attention to them. Lastly these KPIs must be directly linked to individual performance appraisals to drive accountability.

9) Build your sustainability

Every supply chain is facing furious challenges today. These challenges will only become worse in future years. How do you develop a business strategy so you can stay strong? Building your supply chain sustainability is a key.The Institute for Supply Management (ISM) defines sustainability as ―The ability to meet current needs without hindering the ability to meet the needs of future generations in terms of economic,

5.8Organizational issues to implement Supply Chain Management:

Supply chain managers have seen increasing challenges to create, and keep, efficient and effective supply chain methods. Here we discuss five of the biggest supply chain challenges.

- Customer service - Supply chain management is all about providing the right product in the right quantity to the right place and the right time. Seems simple, but can get complicated...quickly.
- Cost control - Operating costs are under extreme pressure by rising energy/fuel and freight costs, greater number of global customers,

technology, increasing labor rates and new regulations and rising commodity prices.

- Planning & risk management - In order to stay as efficient and effective as possible, periodic assessments and redesigns are needed. These adjustments are in response to changes in the market - changes such as new product launches, global sourcing, credit availability and the need to protect intellectual property. These risks must be identified and quantified in order to control and mitigate.
- Supplier/partner relationship management - It is important to create, understand and follow mutually agreed upon standards to better understand current performance and opportunities for improvement. Having two different methods for measuring and communicating performance and results wastes time and effort. Trust the system that was put in place for consistent results and better supplier/partner relationships.
- Talent - This was touched on in a previous post. It is becoming increasingly more difficult to find qualified and interested talent. Supply chain leaders need an extensive understanding of the key competencies and duties needed for supply chain management roles and the ability to efficiently source specific skill sets and methods for developing future leaders.

Globalization:

One of the biggest challenges that companies are facing is how to reduce their supply chain cost. In order to satisfy customers‘ price expectations, companies have opted to relocate manufacturing to low cost countries around the world in an effort to reduce direct and indirect costs and to minimize taxes.

Customer Preferences:

As stated above, global supply chains are complex. Add to that product features that are constantly changing, and the challenge is even greater. A product is released and customers rapidly pressure companies to come up with the next big thing

Market Growth:

Another factor that presents a challenge is the pursuit of new customers. The cost of a developing a product, from R&D to product introduction, is significant. Therefore, companies are trying to expand their distribution to emerging markets in order to grow revenues and increase market share. Companies all around the world are expected to expand in their home and foreign markets. The introduction to new markets is difficult due to trading policies, fees, and government policies.

S.SHAHUL HAMEED

ASSISTANT PROFESSOR

SADAKATHULLAH APPA COLLEGE

TIRUNELVELI-627011