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1. INTRODUCTION TO LOGISTICS

In any organization a huge amount of material is shifted from source to the destination. This indicates that raw material is collected from suppliers and the finished product is delivered to the customers. Logistics is defined as a business planning framework for the management of material, service, information and capital flows. In today's world companies are facing increasing levels of competitive pressures in sustaining, maintaining and improving profitability and reputation. The management is being forced to apply innovative strategies to have a competitive advantage over other firms. Optimizing the logistic activities can become a core competency and thus many companies now understand the need and are investing time to balance supply chain.

Logistics refers to the management of the flow of goods and services between the point of origin and the point of consumption in order to meet the requirements of customers. Logistics involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, and occasionally security. Logistics is a channel of the supply chain which adds the value of time and place utility. Today the complexity of production logistics can be modeled, analyzed, visualized and optimized by plant simulation software.

Primary logistics activities and decisions

- ✓ Helps the marketing department to set customer service levels
- ✓ Facilitates taking location decisions
- ✓ Helps in performing transportation activities (Example - transportation mode selection, vehicle scheduling, carrier routing, facilitates in maintaining inventory (inventory short-term forecasting, planning and control, cooperate with production to calculate EOQ, sequence and time production)
- ✓ Facilitates in collection of information, maintaining flows and order processing
- ✓ Helps in warehousing and materials handling
- ✓ Helps in performing packaging activities

Logistics involves designing, managing, and improving the movement of products through the supply chain. The supply chain is all the firms that engage in activities necessary to turn raw materials into a product and put it in the hands of the consumer or business customer. The difference between a supply chain and a distribution channel is the number of members and their function. A supply chain consists of those firms that supply the raw materials, component parts, and supplies necessary for a firm to produce a product plus the firms that facilitate the movement of that product from the producer to the ultimate users of the product i.e., the channel members.

Physical Distribution

Logistics has the objective of delivering exactly what the customer wants at the right time, in the right place, and at the right price. In planning for the delivery of goods to customers, marketers have usually looked at a process termed physical distribution, which refers to the activities used to move finished goods from manufacturers to final customers. Physical distribution activities include order processing, warehousing, materials handling, transportation, and inventory control. This process impacts how marketers physically get products where they need to be, when they need to be there, and at the lowest possible cost.

In logistics, the focus is on the customer. When planning for the logistics function, firms consider the needs of the customer first. The customer's goals become the logistics provider's goals. With most logistics decisions, firms must compromise between low costs and high customer service.

Components of logistics management

- ✓ Input into logistics: Natural Resources (Land, Facilities and Equipment), Human Resources, Financial Resources, Information Resources
- ✓ Management Actions: Planning, Implementation, control
- ✓ Suppliers: Raw material inventory, in process inventory, finished goods
- ✓ Output of logistics: Marketing Orientation (Competitive advantage), efficient movement to customer, proprietary asset, time-place utility

Tasks performed in logistics

- ✓ Customer Service
- ✓ Forecasting Demand
- ✓ Channel the Distribution
- ✓ Material Handling
- ✓ Inventory Control
- ✓ Processing the orders
- ✓ Service Support
- ✓ Plant and Warehouse Site Selection
- ✓ Procurement

1.1. Interfaces between Logistics Manufacturing.

The manufacturing and logistics functions must take action optimistically to maintain its competitive position in a dynamic industry, by considering the network of manufacturing/logistics as a whole and work towards continuous improvement coordinated across the various activities like delivery service, production priority control and purchasing to exploit the synergy available.

The primary strategies followed by every organization in the competitive environment are

- ✓ Cost leadership: Cost leadership refers to producing lowest-cost goods in the industry
- ✓ Meaningful differentiation: This factor is a very important and integral component as it assists the organization to differ from its competitor either in terms of service (delivery time, reliability etc.) or in terms of technical services (superior features, superior product etc). Organizations have evolved new approaches to develop interface between two functions and integration is the driver to achieve competitive advantage in the market

Logistics connects the manufacturing from both characteristics of inputs i.e., suppliers of raw materials and characteristics of market i.e., customers or end users. For a given manufacturing organization there is a production/branch warehouse configuration, which satisfies most constraints or pressures imposed by the inputs or the markets. The primary determinants for an effective operation of manufacturing/logistic interface are as under

- ✓ Capacity: Cost associates to location and logistics. Firstly production capacity must correspond in some manner to the market demand and production capacity matching the logistics network

as per the requirement such as procurement, storage, order entry and processing, outbound transport, branch warehouse and customer delivery in the end.

- ✓ Location: The capacity issues are very crucial decision and are required to change as per the market demand and demand locations. Short-term solutions can be capacity enhancement by overtime, second and third shifts, third party contracting, extension of the existing facility and long-term solution are additional facility in a new location or extensive capacity in new location. Short term decisions possess the least risk, and impact on the logistics network only in terms of the additional capacity requirement where as long term solution demand a re-evaluation of the manufacturing/logistics network not only in terms of the capacity of each component but also the strategic necessity and location of each facility (factory, warehouse) in terms of its contribution to the effectiveness of the total network. In other words, a change in location and capacity of any one facility requires a review of the location and capacities of all other facilities. Clearly, the issues involved in location, capacity and logistics are inextricably linked.

Competitive priorities and manufacturing strategy

The ability of a supply chain to compete based on cost, quality, time, flexibility, and new products is shaped by the strategic focus of the supply chain members. A firm's position on the competitive priorities is determined by its four long-term structural decisions: facility, capacity, technology, and vertical integration, as well as by its four infrastructural decisions: workforce, quality, production planning and control, and organization. The cumulative impact of infrastructural decisions on a firm's competitiveness is as important as long-term structural decisions.

Manufacturing strategy focuses on a set of competitive priorities such as cost, quality, time, flexibility, and new product introduction. It classifies production processes to five major types: project, job shop, batch, line, and continuous flow. "Make-to-stock", "Assemble-to-order", "Build-to-order" and "Engineer-to-order" are a few of the manufacturing strategies used to address competitive priorities to compete on the market place.

- ✓ Make-to-stock: Make-to-stock involves holding products in inventory for immediate delivery, so as to minimize customer delivery times. This is in the category of push system. Demand is forecasted and production is scheduled before demand is there
- ✓ Assemble-to-order: Assemble-to-order is the strategy to handle numerous end-item configurations and is an option for mass-customization. Assemble-to order items use standardized parts and components. They require efficient and low cost production in the fabrication process and flexibility in the assembly or configuration stage to satisfy individualized demand from customers
- ✓ Build-to-order: Build-to-order, on the other hand, produces customized products in low volume after the manufacturer receives the orders. Build-to-order items are usually in very small volumes and require high technical competency, high product performance design, and effective due date management
- ✓ Engineer-to-order: Engineer-to-order produces products that are with unique parts and drawings required by customers. Product volume is very small and typically is one-of-a-kind in a job-shop environment. The cycle time from order to delivery is usually long because of the unique customization nature

1.2. Logistics: Manufacturing issues in Customer Service

Customer service policy is an on-going process of increasing both the quality and number of links between the manufacturing organization and the customer. The whole emphasis in today's service intensified businesses are to increase a series of both human and information based technological relationships between customer and the organization so that better customer services and satisfaction to the customer can be realized.

Manufacturing/logistics issues at the interface for better customer service are as follows

- ✓ Forecasting Demand: Product forecasting in the short to midterm contribute to the process of ensuring the availability of stock for customers. This includes the use of distribution requirements planning wherever appropriate. For the longer term, forecasting at the product group level is crucial for manufacturing capacity and flexibility decisions
- ✓ Customer and Supplier System: Organizational systems will need to be directly related to the issues of how to bind the customer more tightly to the organization and how effectively integrate suppliers into the overall supply chain with the objective of enhancing customer oriented service
- ✓ Plant Configurations: Both cost structure and service levels impact heavily on location, nature and operating performance of manufacturing facilities, central warehouses and branch warehouses. In the longer term, and in conjunction with other factors (systems, supplies), the plant/branch configuration is a major structural input to reducing overall supply chain costs

A need for reorganization of the logistics (supply chain) network from supplier through to customer will be required, once the associations between manufacturer and the customer and manufacturer and the supplier are complete, for two reasons

- ✓ Technology available, particularly information technology, will allow certain plant/branch configurations, previously ruled out, to be feasible
- ✓ The cost of the network will be required to reduce (in real terms) continuously

A key feature of this process will be the requirement of involving in an appropriate manner both customers and suppliers. This will be new ground for many organizations and will force a re-evaluation of values and mission in some circumstances.

1.3. Production scheduling

Scheduling is an important tool for manufacturing and engineering, where it can have a major impact on the productivity of a process. In manufacturing, the purpose of scheduling is to minimize the production time and costs, by telling a production facility when to make, with which staff, and on which equipment. Production scheduling aims to maximize the efficiency of the operation and reduce costs.

Production scheduling tools greatly outperform older manual scheduling methods. These provide the production scheduler with powerful graphical interfaces, which can be used to visually optimize real-time workloads in various stages of production, and pattern recognition allows the software to automatically create scheduling opportunities, which might not be apparent without this view into the data. For example, an airline might wish to minimize the number of airport gates required for

its aircraft, in order to reduce costs, and scheduling software can allow the planners to see how this can be done, by analyzing time tables, aircraft usage, or the flow of passengers.

Companies use backward and forward scheduling to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials. In forward scheduling is planning the tasks from the date resources become available to determine the shipping date or the due date and in 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, leveling
- ✓ Reduced scheduling effort
- ✓ Increased production efficiency
- ✓ Labor load leveling
- ✓ Accurate delivery date quotes
- ✓ Real time information

1.4. Interfaces between Logistics and Marketing

The key to satisfy customer needs requires the organizations to be functionally interdependent. In spite of the realization that cooperation is essential by logistics and marketing manager, the marketers often criticize logistics department for minimizing the cost and thus having no concern for customer needs. On the other hand logistics department accuses marketers of meeting the sales target at any cost. Therefore it is essential that organizations identify area of agreement and potential conflict. This can be done by assisting in measurement of performance and hence reward cooperation and a spirit of interdependence that actively discourages insular behavior.

Relation between Logistics and Marketing

An organization is able to distinguish itself from its competitors by offering a total service with logistics forming an essential part of the total value chain.

The most prominent components of interaction between logistics and marketing include

- ✓ Pricing: Since the costs involved in bringing the product from its warehouse to the selling counter is included in the pricing, the right strategy in logistics can increase or decrease the price
- ✓ Product Design: If the product is bulky, a special warehouse will be needed. Example - If apples have to be transported a cold storage is required
- ✓ Customer Service: Customer if doesn't get the product at the right time, he may switch to some other brand. Thus marketers and logistics people work together to ensure delivery of the product according to customer needs
- ✓ Market and Sales Forecasts: Forecasting can only be done after logistics department provides the planning and in detail supply chain activities on paper to the marketing team
- ✓ Location and Number of Warehouses: Though this is a question that logistics has to answer but it entirely depends on the marketing team because they know the demand and supply

- ✓ Inventory guidelines: Inventory policies have an important bearing on operational costs and the extent to which desired levels of customer service are achieved. Under this component the policy should be developed jointly
- ✓ Processing of orders: Orders can only be fulfilled once the logistics team has made sure the product is available for selling at the right place and right time
- ✓ Distribution Channels: The level of logistics resources required is greatly affected by the decisions to deliver direct to the customer or through intermediaries. Example - If the marketing team thinks they want to use more money on advertising and less on the commissions given to the channel partners, logistics group might have to cut down on the supply chain to meet the requirements of the company.

The fundamental dimensions of customer service are Availability, performance and reliability

Definitions

- ✓ Availability: Availability is the capacity to have inventory when it is desired by a customer. The three measures to check availability are stock out frequency, fill rate and order shipment
- ✓ Stock out frequency: Stock out frequency is a measure of how many times demand for a specific product exceeds availability. Stock out frequency is a starting point in measuring inventory availability
- ✓ Fill Rate: Fill rate measures the magnitude or impact of stock out over time. If a customer orders 50 units and only 47 units are available, the order fill rate is 94 per cent (i.e., 47/50)
- ✓ Order shipped complete: order shipped complete is a measure of times that a firm has the entire inventory ordered by a customer. Order shipped complete establishes the potential times that customers will receive perfect orders
- ✓ Base stock: determined by forecast variance requirements and held to support basic availability
- ✓ Safety stock: To cover demand that exceeds forecasted volumes and to accommodate unexpected operational eventualities. Safety stock exists to accommodate forecasted and cushion delivery delays during base stock replenishment
- ✓ Operational performance speed: Performance cycle speed is the elapsed time from when an order is placed until shipment arrival viewed from customer's perspective. Typically, faster the planned performance, the lower the level of inventory investment required by customers
- ✓ Consistency: Consistency refers to a firm's ability to perform at the expected delivery time over a large number of performance cycles
- ✓ Flexibility: Operational flexibility refers to a firm's ability to handle extraordinary customer service requests such as product modification or customizations for specific markets or customers, new product introduction. A firm's overall logistical competency depends on the capability to "Go an extra yard"
- ✓ Malfunction/Recovery: During service failures, capability to have contingency plans and to anticipate the service breakdowns and have recovery
- ✓ Reliability: Logistics quality is all about reliability. Ability to comply to levels of planned inventory availability and operational performance is key to provide reliable service