Sales, Distribution and Supply Chain Management

SEMESTER - IV

MASTER OF COMMERCE

BLOCK - 2

(Marketing Sepecialisation)

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Block 2
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BLOCK INTRODUCTION

This is these cond block of the course "Sales, Distribution and Supply Chain Management". The Block is divided into7 units and is primarily a learner oriented Selfl earning material, asitsatisfies the requirements of the learners in the filed of Marketing.

This block comprises of the following eight units:

The first unit of this block that is eighth unit of this course introduces us to the concept of Supply Chain Management

The ninth unit gives us a broad idea of Inventory management andGreen logistics.

The tenth unit is about Planning Demand and Supply. This unit explains demand management, demand forecasting, supply management and evolution of ERP.

Theeleventhunitwillhelpusinunderstandingprocurementandinventory management.

The twelfth unit is about marketing and Logistic interface.

The thirteenth unit will help us in understanding the Bench marking Concept, Bench marking Process, Bench marking Procedure.

The fourteenth unit is about recent trends in Supply Chain Management, which explains concepts like e- commerce, green supply chain etc.

The last unit of this block discusses some cases related to this course.

Each unit of these blocks includes some along-side boxes to help you know some of the difficult, unseen terms. You may find some boxes marked with: "LETUSKNOW". These boxes will provide you with some additional interesting and relevant information. Again, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your progress of study. It will be helpful for you if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with "ANSWERS TO CHECK YOUR PROGRESS" given at the end of each unit. you in making your learning more active and efficient. And, at the end of each section, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your understanding.

The Block is divided into eight units:

Unit8: Basics of Supply Chain Management

Unit9: New Paradigmin Inventory & Purchase Management

Unit10: Planning Demand andSupply

Unit11: Procurement and InventoryManagement

Unit12: Marketing and LogisticsInterface

Unit13: Supply Chain Bench marking

Unit14: Recent trends in Supply Chain Management

Unit15: Case Study

UNIT 8: BASICS OF SUPPLY CHAIN MANAGEMENT

UNIT STRUCTURE

8. 1 Learning Objectives

8. 2 Introduction to Supply Chain Management

8. 3 Evolution of the Concept of Supply Chain Management

8. 4 Drivers of Supply Chain Management

8. 5 Typology of Supply Chains

8. 6 Process View of Supply Chain

8. 7 Challenges in Supply Chain Management

8. 8 Bullwhip Effect

- 8.8.1 Causes of Bullwhip effect
- 8.8.2 Handling Bullwhip effect

8. 9 Let Us Sum Up

8. 10 Further Reading

8. 11 Answers to Check Your Progress

8. 12 Model Questions

8. 1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the basics of Supply Chain Management
- explain the concept of Supply Chain Management and its importance
- describe the typology of supply chains
- explain the cycle view of supply chain
- learn the different drivers of supply chain management
- understand the concept of bullwhip effect in supply chain

8. 2 INTRODUCTION TO SUPPLY CHAIN MANAGEMENT

Supply Chain Management is a process ensuring a smooth flow of goods and information along the chain from supplier/producers' end to the customers' end. The process is an integrated whole of various business functions including customer orders, distribution, logistics, delivery of goods,

alongside the flow of information pertaining the sales data, orders received, replenishment data, etc. The process closely monitors the information flow at various stages of the process. To be specific Supply Chain Management can be defined as:

"An integrated whole of processes that integrates components of producers/suppliers, manufacturers, distributors, transporters, etc. to ensure smooth flow of goods and services at the customers' end at the expense of minimum resources and in desired time, quantity and locations".

Value Chain:

Supply chain refers to the entire chain of activities of goods or services from manufacturing to the delivery at the customers' end. It involves resource optimization with service level. Value Chain in contrast pertains to each stage/component within the supply chain. According to Michael Porter, value chain receives materials/semi-finished goods to add value through different processes to provide a value-added product to its customers. Competitiveness to a firm is obtained through cost effective delivery of goods and services. Any industry has a set of primary activities (inbound logistics, operations, outbound logistics, sales, and service) and support activities(procurement, technology, firm infrastructure, human resource management). Of all the activities a firm is generally efficient in performing a few of the activities effectively and efficiently than its competitors. It, therefore, follows that the firm ought to focus on activities of inherent expertise and obtain the other activities from external partners. In the process the necessity of a strong relationship with the partners can prove make or break relationship in the market. This is because a healthy relationship with the partners can be complementary to the activities of the firm. The role of supply chain management is more pronounced herein. A tightly associated relationship can ensure smooth flow of goods and service at the right place, at the right time and in right quantities.

8. 3 EVOLUTION OF THE CONCEPT OF SUPPLY CHAIN MANAGEMENT

The evolution of Supply Chain Management could be traced to the

period wherein production and marketing of goods proliferated. This leads to the era of industrial revolution wherein goods were produced in mass scale resulting in the necessity of selling of the produced goods. The same led to the proliferation of markets for easy access to buyers aided by the developments in transportation.

Early supply chain managements have been as simple as the evolved system for storage of finished goods, transportation of goods to the buyers end and storage of finished goods that could not be sold. This period pertains to the producers' era wherein varieties in products were limited to a few. The producer arranged for transportation, distribution and sale of the produced goods and had to work with high levels of inventory. This simple chain included stages of production, transportation, and distribution. Yet itwas rigid to handle variations of demand, variety, and availability.

The early Twentieth Century saw a growth in manufacturing technology, leading to increase in availability of variety of products. This influenced the producers to ensure variety in products, and handle a proportionately adequate inventory against each variety. This necessitated the chains to be flexible to handle variations of market demands. Customer responsiveness gained priority necessitating the firms to optimize costs and design the process of production, distribution, and sale of products to satisfy the growing demands of customers. Batch production gained prominence and compelled firms to procure raw materials and other resources at competitive prices. This propelled the initiation of goodwill with the suppliers and for a long term sustainable relationship as a win-win strategy for the suppliers and the producers in totality.

The Twenty-First century brought in information technology with tremendous influence in the manufacturing sector. Obtaining information about availability of inventories, market variations, orders could be tracked apparently at no time and relentlessly. This revolutionized the chain enabling mass customization propelled more by actual customer orders rather than by forecasts and findings from previous data. Additionally, information sharing among partners in the chain helped to reduce inventories, serve

markets better and nullify fluctuations of demands across the chain. Enterprise Resource Planning (ERP) helped firms to be responsive and robust to market fluctuations. Information technology facilitated by advanced manufacturing and other technologies led to ease of availability of variety of goods across the globe.

8. 4 DRIVERS OF SUPPLY CHAIN MANAGEMENT

In this section we are going to discuss the factors that facilitate the growth and development of supply chain management.

Drivers of Supply chain Management:

1. Information Technology

The growth of information technology has been a key driver of supply chain management. IT has enabled real time access to sales data, location tracking of goods, fluctuations in customer demand data, order tracking, etc. This has been the feeder to managing manufacturing, streaming logistics, planning sales, etc. Transparency along the chain has been attained with the usage of IT along the linkages of the chain. Enterprise Resource Planning (ERP) and Radio Frequency Identification (RFID) technology have been instrumental in close coordination among the partners within a chain and visibility of data across the partners. With the adoption of IoT(internet of things) enhanced automation is made possible by virtue of which firms can be more responsive to changes in customers' demands, sudden variations in the logistics, optimization of shipments, etc. The competitive advantage of Walmart lies in its usage of information technology for connectivity amongst the stores, maintenance of a centralized database and automated replenishment system.

2. Facilities:

Facilities pertain to location where products are manufactured, assembled and stored. The locations of these facilities, capacity, and flexibility of manufacturing have significant impact on the supply chain. The decision may be of locating the assembling facilities nearby a centralized location or it could beat the level of customers to provide

ease of handling, transportation and reduce cost.

3. Inventory:

Raw materials, work in progress, finished goods constitute inventory within a supply chain. The lower the inventory maintained, the moreefficient is the supply chain. Maintaining high levels of inventory involves risks of damages, obsolescence, in addition to high inventory costs. In the dynamic market of present day, firms need to be responsive to customers' changes in taste and preferences and hence must be responsive tosuch changes. In view of the rapid technological advancements, the technological lives of products have been cut down drastically. This has compelled firms to maintain minimal or no inventory of raw materials, work in progress and finished goods. For example Dell has successfully practiced the principle of maintaining minimal inventory. Any production in Dell is triggered by a customer order. Principles of lean manufacturing and Just in Time (JIT) have been instrumental in reducing inventory costs in a chain by reducing wastes and reducing inventory along the chain. Mahindra & Mahindra has been implementing JIT successfully.

4. Transportation

The physical movement of raw materials, work in progress and finished goods is facilitated by transportation. An efficient mode of transportation can serve customers with minimal of time. The transportation strategy used can optimize the chain or add to its costs. The hub and spoke model used in courier services facilitates easy and efficient transportation of parcels and simplifies the process. The mode of transportation has enabled the growth in the online retail industry largely.



CHECK YOUR PROGRESS

Q 1: Define Supply Chain.

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Q 2: What is a Value Chain?

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Q 3: State four drivers of supply chain management.

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8. 5 TYPOLOGY OF SUPPLY CHAINS

Supply chains can be classified into the four types stated below:

a) Make-to-stock type:

Make –to-stock type chains rely on forecasts data to stock products at the end of the chain. Accurate forecasts enable firms to eliminate risks of stock out and facilitate product availability on-the-shelf. FMCG products, apparels fall into make-to-stock category of supply chains normally. The ability of the firms to predict fashion trends enable them to lead the market by making predicted apparels available on-the-shelf much ahead of the competitors, thereby driving the trends of fashion.

b) Build-to-order type:

The type builds or assembles products based on specifications of the customer demands. The type uses customer order data to produce a customized product. Assemblies and sub-assemblies at the distributor or manufacturer level are standardized and robust to accommodate variations of customers' demands. The type is analogous to mass customization. Dell until recently has been using this type for its PCs.The type is advantageous to make-to-stock in that it reduces finished good inventory, eliminates risks of obsolescence, and provides customized customer demands.

c) Continuous Replenishment type:

The type continuously monitors sales patterns to replenish sold inventories. The success of the type lies in close coordination among the partners and a transparent flow of information across the chain. The type maintains no inventories and provides high service level.

Though costly in terms of multiple shipments required yet firms like IBM have been using Automated Vehicle Load Building causing reduced transportation costs.

d) Channel Assembly type:

This type of supply chain is a modification of the build-to-order type in that assembly of the product is done as the assemblies move along the chain. Generally practiced in multi-locational sourcing of components and assemblies, the type is popular with computer technology industry. Third party logistics providers are instrumental in the assembly of the products on the go. Micro Ingram has been using this type of supply chain.

8. 6 PROCESS VIEW OF SUPPLY CHAIN

A Supply Chain process may be categorized into two based on the flow of information and the interface of the stages one over the other. The processes depict the completion of activities in each stage, the activities initiated to fulfill orders and to ensure delivery of goods to the end customers. Generally two types of processes are explicit in a supply chain.

1. Cycle view of Supply Chain

2. Push/Pull view of Supply Chain

1. Cycle view of a supply chain

Cycle view of a supply chain integrates the chain into a number of smaller cycles that work in unison to complete the delivery to the customers. Cycle view of a chain describes the role of each stage within the chain and influence one stage over the other. A supply chain can be seen as a set of cycles between stages. Normally there are five stages in a supply chain comprising the customer, retailer, distributor, retailer, manufacturer, and the supplier. At the interface of each stage lie the customer order cycle, replenishment cycle, manufacturing cycle and the procurement/sourcing cycle respectively.

Each cycle consists of some subprocesses that work in unison to complete the cycle. In the customer order cycle the subprocesses involved are the customer order, customer order fulfilment and the customer order

receiving from the immediately following stage. At each cycle the objective of the stage is to fulfil the order of the customer effectively and efficiently. During purchases at a departmental store, the customer purchases initiate stock replenishment therefore requiring order replenishment from the distributor. The order of the store, hence, forms the customer order for the distributor and accordingly at each stage upwards. However, in terms of quantity, the order size at the distributor level is larger than the order size of the sum-total of customer orders at the store level. Similarly, the supplier of batteries of mobile phone can predict the battery requirement based on the production schedule of mobile phones. An interesting phenomenon observed as the stages progress high is that the variation at one stage is reflected at the higher stages in terms of orders but on a multiplied scale, leading to higher variations of information at each higher level. Better described as the bull whip effect, the phenomenon is described later in this unit.

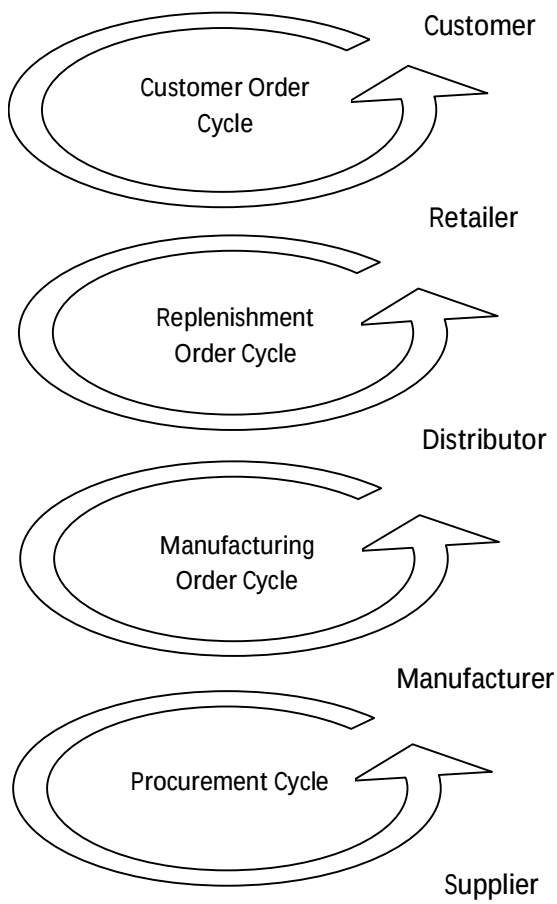


Fig: 8.6: Cycle View of Supply Chain

2. Push/Pull view of supply chain

The purpose of any supply chain is to ensure close coordination amongst the different stages to attain free flow of information. It has been learnt that the coordination leading to accurate decisions in inventory managementis achieved by virtue of linking the customer order level with the manufacturing level. This provides status of customer orders and market demand variations to the manufacturers' end enabling production in exact lines with customer demands and facilitates accommodating the market demand fluctuations in the production schedules.

The push/pull view of a supply chain is in response to the timing of response to customers' uncertain demand.

The push view pushes the products to customers' end based on market forecasts of demand. Manufacturing is triggered by forecasts data of demands at the immediately following stage of the chain. Since the process uses forecast data, it is less responsive in terms of time, necessitates holding of inventory and at times is unable to meet the variations of market demands. The impact of bull whip effect is more pronounced in push view of supply chain. The variation in customer demand data produces low responsiveness, loss for obsolescence of products, larger inventory in terms of safety stock.

The pull view in contrast responds to customer demands made and works on actual demand data. Since it is responsive to customer demands, holding inventory at various stages along the chain is eliminated. The adequacy in transparency of customer demands has contributed to drastic decrease in variability of demand data across the chain and lead-time. Management of resources has been proved better and it has facilitated in taking advantage of economies of scale.

8.7 CHALLENGES IN SUPPLY CHAIN MANAGEMENT

Supply chains across industries are diverse in operation and functions, type of products handled and customer demands. This presents complexity in providing a single prescription to the problems rampant in each sector and industry. The diversity in the type of products determines

the nature of storage requirements, transportation specifications, etc. Challenges in a supply chain in food sector are of cold chain requirements in transportation and storage, adequate infrastructure for delivery and marketability of farm fresh products, packaging and conformance to quality specifications and delivery of products in desirable form. Food products have short shelf life necessitating usage of faster modes of transportation but for the higher costs of such modes, the industry lands up in huge loss of decay of the products.

The retail supply chain faces challenges of managing Omnichannels, managing inventory across multiple locations, managing workforce, etc.Inventory needs to be sensitive to the customer demand and preferences to avoid stock-outs and loss of brand preferences. The availability of multiple channel delivery for products of a brand has proved costly for the multi-brand outlets. Customers are prompted to procure products through channels which are more responsive to returns, alterations, and replacements. The success of online retailing has been owing to the responsiveness of the channel. Customer preference is more a fad or trend sensitive in retail industry. The other complexity in retail is the reverse supply chain for out of date products. Success in retailing can be attributed to trend responsiveness, multiple channel integration and low inventory maintenance, integration among the partners as in case of retailers like Walmart, Future group, etc.

Overall, some of the challenges faced by supply chains are as below:

a) **Globalised business:** business across countries has brought in risks of lead time delays caused by factors specific to regions that often elongate the lead time. This at times causes damage in products and obsolescence.

b) **Growing customer expectations:** Easy availability of variety across the globe has made competition stiffer. Expectations of customers in terms of product variety, quality, and standards have grown diverse leading to pressure on the firms to satisfy the diverse growing demands.

The fast changing customer base has evolved a number of segments

of varied types. Each segment has a diverse set of preferences, interests and demands. This has necessitated multiple numbers of products for the different segment. The concept of one size fits all is no more possible.

c) **Changes in policies:** countries across the globe have diversity in policies of business causing imperative to the firms to follow a variety of guidelines in a variety of regions. Accommodating such changes is a hurdle in business

d) **Availability of partners:** Countries like India have had an unorganized logistics sector until very recent days. Earlier, firms had to partner with a variety of diverse logistics vendors of varied types, adding complexity to the already complex supply chain.

e) **Scarcity of talent pool:** Some businesses require specific expertise as in the case of electronic manufacturing, hospitality industry, etc. The unavailability of trained and qualified manpower in the regions leads to sourcing of manpower from other regions raising the cost.

Handling Supply Chain Challenges

a) Supply chain integration:

In the era of demand variations of customers and the variety in taste and preferences of customers, it is necessary to be accurately responsive to the varied demands. Any variation in responding to customer demands could be a costly affair. As a result, it is necessary that the customer requirement information is transparently shared within the chain with no variation at all. Additional to this, material flow is also shared with no variation in the chain. This is possible by a close integration among the partners of the chain. This reduces channel inventories in the chain. Integration can be both internal and external.

Internal integration works to smooth out information variations within departments. ERP systems in organisation have proved to have handled the flow of information and facilitated flow of resources across departments. External integration facilitates accurate translation of demand data into order replenishment without variations. In spite of transparent flow of demands there are possibilities of variations across the chain. Such distortions occur due to conflicts arising of suppliers serving multiple

industries and supplier competing with the end products as cannon which supplies printer heads to HP also competes with HP printers. These distortions can be handled through Vendor Managed Inventory (VMI). VMI has been explained in detail in earlier units.

b) Supply Chain Restructuring:

Supply chain restructuring involves reengineering of the chain to handle inefficiencies in the chain. Most significant restructuring strategies include realigning point of differentiation of products and the customer order point. Realigning the differentiation point helps in postponing differentiation in the products. This enables handling minimum variety across the chain which is easier for warehousing, logistics, rules out risks of obsolescence, etc. Shades of paint are not pre-mixed but are prepared in the retailers end as per specifications of customers. This postpones handling variety and provides a customised product to each customer. Bicycles are assembled in the retailers end and transported in assemblies to reduce transportation costs and to respond to varied customer demands.

c) Agility in Supply Chains:

An agile supply chain is one which is responsive to variations in customer demands. An agile chain uses strategies of postponement as detailed above and follows elimination of wastes within the chain. It is responsive to the variations of volume and variety arising out of seasonality of demand and promotional campaigns. Mass customization and standardization in components and assemblies are enablers of agility in a chain.

8.8 BULLWHIP EFFECT

Bull whip effect derives its analogy from the whip used for taming bulls used in a bullock cart. The force applied at the rear end gets multiplied largely in the front end lashed at the bullock. Similar scenario prevails with fluctuations at one end that traverse through the chain. Fluctuations at the retailers' end get amplified at each higher level; by the time it reaches the manufacturers' end, the variation is enormous.

The effect is a shortage gaming process whereby each player in

the chain tends to evade stock outs because of sudden rise in demand. In the process, each orders a quantity to the upstream member higher than its own needs. Consequently the fluctuations tend to risehigh, until it becomes absolutely enormous and multiplied, and nowhere in lines with the actual fluctuations in the customer demands.

8.8.1 Causes of Bullwhip effect

a) **Isolation in placement of order:** Each member of the chain places order into the higher stage based on its demands and irrespective of the actual demand values at the customers' front. The order size is hence dependent of the demands at the immediately succeeding stage and independent of the market scenario.

b) **Order batching :** Each order received from the downstream member is aligned to suit needs of logistics, warehouse, and production requirements or to optimize suitable needs at each stage. As a result the order size is independent of market demands but become a function of convenience and optimization of each stage independently.

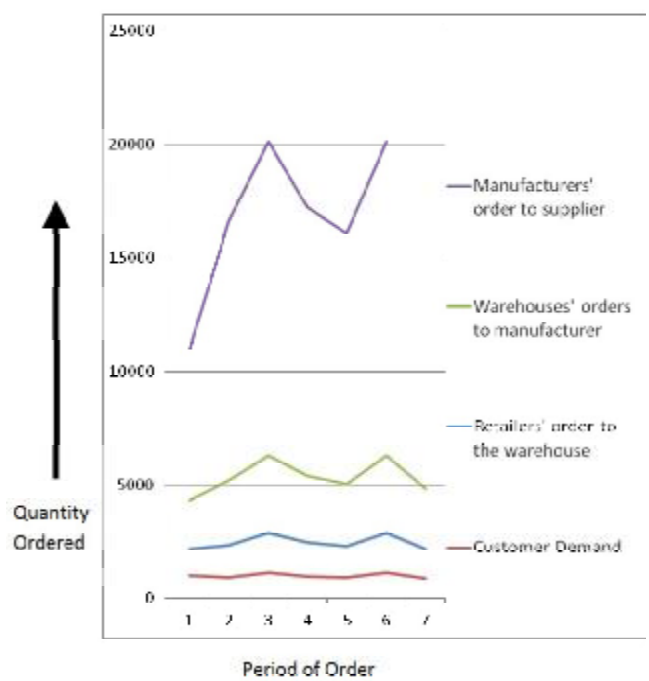


Fig. 6.8: Bullwhip Effect

c) **Uncertainty and delays in delivery :** Uncertainty in delivery caused by delayed deliveries or history of missed delivery dates in the upstream partner compels the stage to raise the order size and prevent stock-outs

d) **Inaccurate customer data:** Unavailability to customer demand data compels stages to make their own calculations of demand and of the orders to be placed upstream based on orders received.

8.8.2 Handling Bullwhip effect

a) **Transparency and access to data:** There should be transparency in flow of demand data from the customers' end to the suppliers'end.This helps each stage to understand the customer behaviour on real time and plan for orders accordingly. Real time access to customer data andgps tracking of in-transit inventory facilitate in attaining transparent data flow all along.

b) **Reduced demand variability:** In response to sudden surges in demand pattern, stages tend to raise the order size lest there would be loss of goodwill due to stock-outs. A consistent demand pattern over a longer period, normally a year, can be obtained by maintaining low price all along the time period as in Amazon's Everyday Low Pricing (EDLP).

c) **Reduced lead time:** Reduction in lead time or orders can eliminate shortage gaming in the stages and facilitate dependence on real time demand data.

d) **Price stability:** Price stability through elimination of quantity discounts discourages stages to place larger orders. This brings stabilityin the demand pattern along the stages.



CHECK YOUR PROGRESS

Q 4: What is a Make-to-Stock type of supply chain?

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Q 5: Define Cycle view of supply chain.

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Q 6: State two challenges faced by supply chains?

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Q 7: What is supply chain restructuring?

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Q 9: State two causes of bullwhip effect.

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8.9 LET US SUM UP

After going through the unit we have learnt the following:

- Supply Chain Management is a process which integrates various business functions including customer orders, distribution, logistics, delivery of goods, alongside the flow of information pertaining the sales data, orders received, replenishment data, etc.
- A tightly associated relationship with vendors can ensure smooth flow of goods and service at the right place, at the right time and in right quantities.
- IT has enabled real time access to sales data, location tracking of goods, fluctuations in customer demand data, order tracking, etc.

- The lower the inventory maintained, the moreefficient is the supply chain. Maintaining high levels of inventory involves risks of damages, obsolescence, in addition to high inventory costs.
- An efficient mode of transportation used can serve customers with minimal of time. The transportation strategy used can optimize the chain or add to its costs.
- Continuous Replenishment type of supply chain continuously monitors sales patterns to replenish sold inventories.
- The push/pull view of a supply chain is in response to the timing of response to customers' uncertain demand.
- The push view pushes the products to customers' end based on market forecasts of demand.
- The pull view in contrast responds to customer demands made and works on actual demand data.
- An agile chain is responsive to the variations of volume and variety arising out of seasonality of demand and promotional campaigns.
- Fluctuations at the retailers' end get amplified at each higher level; by the time it reaches the manufacturers' end, the variation is enormous. This phenomenon is called bullwhip effect



8.10 FURTHER READING

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5) D K Agarwal, *Textbook of Logistics & Supply Chain Management* (2007), Macmillan India (P) Ltd., India.

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8.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Supply Chain Management is a process ensuring a smooth flow of goods and information along the chain from supplier/producers' end to the customers' end.

Ans to Q No 2: Value chain receives materials/semi-finished goods to add value through different processes to provide a value-added product to its customers.

Ans to Q No 3: Four drivers of supply chain management are-

a) Transportation,

b) Inventory,

c) Facilities and

d) Information Technology

Ans to Q No 4: Make –to-stock type chains facilitates the availability of goods based on forecasts. Customers get access to such products at POS.

Ans to Q No 5: Cycle view of a supply chain integrates the chain into a number of smaller cycles that work in unison to complete the delivery to the customers. Cycle view of a chain describes the influence of one stage over the other.

Ans to Q No 6: Two challenges faced by supply chains are as below:

a) Globalised nature of business causing lead time delays leading to damage in products and, obsolescence.

b) Growing customer expectations leading to pressure on the firms to satisfy the diverse growing demands.

Ans to Q No 7: Supply chain restructuring involves reengineering of the chain to handle inefficiencies in the chain. Most significant restructuring strategies include realigning point of differentiation of products and the customer order point.

Ans to Q No 8: Two causes of bullwhip effect are:

a) Isolation in placement of order and

b) Order batching.



8.12 MODEL QUESTIONS

Q 1: Differentiate between supply chain and value chain.

Q 2: Describe in brief the evolution of supply chain management.

Q 3: How has information technology been instrumental in integrating the stages in a supply chain?

Q 4: How does a build-to-order type supply chain differ from a continuous replenishment type chain?

Q 5: Discuss a few challenges faced by supply chains.

Q 6: The pull view in contrast responds to customer demands made and works on actual demand data.Discuss.

Q 7: Compare and contrast cycle view and push-pull view of supply chain.

Q 8: Illustrate with examples the benefits of supply chain integration.

Q 9: What are the causes of bullwhip effect? How can information technology help to reduce bullwhip effect?

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UNIT 9: NEW PARADIGMS IN INVENTORY AND PURCHASE MANAGEMENT

UNIT STRUCTURE

9.1 Learning Objectives

9.2 Self-Certified Vendors

9.3 Green Channel suppliers

9.4 Vendor Managed Inventory-

- 9.4.1 Prerequisites of VMI
- 9.4.2 Flow of Information for VMI
- 9.4.3 Advantages of VMI

9.5 Green Logistics

9.6 Let Us Sum Up

9.7 Further Reading

9.8 Answers to Check your progress

9.9 Model Questions

9.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the need and importance of self-certified vendors
- explain the role of green channel suppliers in supply chain
- learn the pre-requisites of VMI
- the advantages of VMI over traditional methods of distribution of inventory
- need and importance of green logistics in designing an environmentally friendly supply chain.

9.2 SELF CERTIFIED VENDORS

Prior to receiving goods in the form of parts, components, spares, etc. it is customary to conduct a rigorous inspection for assessing the quality of the goods supplied. The inspection process helps in isolating defective supplies. It has been more the responsibility of the buyer to trace and

eliminate defective supplies than the responsibility of the supplier to provide defect free goods. The process resulted in receiving only error free supplies but yielded a cumbersome and costly process for both parties. Additionally the buyer had to arrange for getting all the supplies done prior to receiving. This meant that the buyer would have to take the assistance of a third party that would perform the inspection on instances where in-house expertise or infrastructure was not available.

Inspection process conducted hence was a huge cost intensive process. The results at times led to holiday listing of the suppliers. The process used to be one time exercise with no scope for a long term relationship between the duo.

In view of attaining a long term win-win cost effective relationship between the supplier and the buyer, dependence on inspection had to be reduced fairly. This necessitated that the supplier performed necessary quality checks and provided only quality goods as per specifications of the buyer. Eventually the vendors have to certify the supplies in terms of quality, specifications, time, etc. as required by the buyer. The process required that the vendors would obtain a self-certified vendor certificate from the buyer. The certificate is a testimony of the assurance in terms of specification of the supplies provided and make facilitates a long term relationship between the vendor and the buyer. An essential requirement for this is the implementation of quality management system by the vendor in its operations and in the supplies. Mahindra & Mahindra and Tata Motors are some firms employing Self-certified Vendors in their businesses.

Self-certified vendors streamline the business process to the extent of employing JIT manufacturing practices. The vendor relentlessly has to improvise on its supplies in line with the requirements of the buyer firm. A closely coordinated association between the two can be the critical success factor for the process.

9.3 GREEN CHANNEL SUPPLIER

A Green channel Supplier is a supplier that which provides the supplies of goes in the form of spares, components, or parts directly into

the assembly line. The suppliers bypass the normal inspections, which are generally essential prior to acceptance of any part or components by a supplier. Green Channel suppliers demonstrate a high degree of performance trust in terms of quality of the products delivered whereby the necessity of inspection is eliminated. The process drastically reduces the time of production and eliminates possible stopovers. This feature provides greater inventory control and coordination of the suppliers and the buyer duo facilitating a long term relationship. A closely coordinated long term vendor-buyer relationship is an outcome of the same. Green Channel Suppliers helps in enabling JIT practices, makes the system responsive to variations of the market and facilitates extensive goodwill of the firms.



CHECK YOUR PROGRESS

Q 1: Define Self-certified Vendor.

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.....

Q 2: What is a green channel supplier?

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.....

Q 3: State two advantages of self-certified vendors.

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9.4 VENDOR MANAGED INVENTORY(VMI)

Vendor Managed Inventory (VMI) is a process to include greater levels of coordination and control over the entire distribution network to provide high level of customer service and ensuring a high level of responsiveness within the chain.

In traditional distribution systems, the orders are initiated from the end of the customers/retailers and are passed on to the Distribution Centres which are percolated to the manufacturers'. The distributors are absolutely in no control of inventory status unless the information is passed on by the

customers. This leads to uncertainties at the end of the distributor in planning for future out-bound inventory. Such uncertainties of order size at times lead to bull whip effect in the system.

VMI is a forward looking initiative wherein the status of inventory at the customers/retailers' end is available to the distributor. Since the inventory status in visible to the distributor, the distributor can plan for replenishment of the customers" inventory and perform the requisite planning for the same. This helps in optimising the performance of the supply chain helps in ensuring a high level of customer responsive chain. The vendor makes the inventory replenishment decisions and in full control over the customer inventory levels and the levels of manufacturer.Procter and Gamble with Walmart has been the pioneer in implementing VMI in its business processes. Novartis, Daimler are popular and successful instance of VMI implementation. In VMI, the vendor manages the inventory based on real time inventory status obtained from the retailers/customers' end. The planning and distribution is the onus of the supplier. The decisions pertaining to order quantity to be shipped, time for shipping and lot size are decided by the supplier. The role of the retailer becomes minimal as all inventory replenishment decisions are vested upon the supplier.

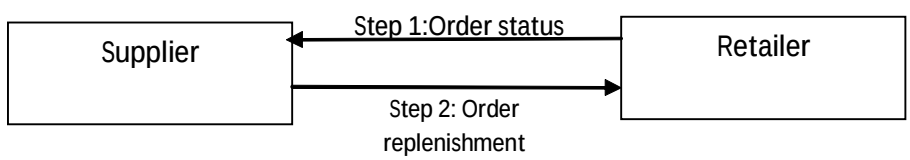


Fig: 9.9(a): Traditional Flow of Information

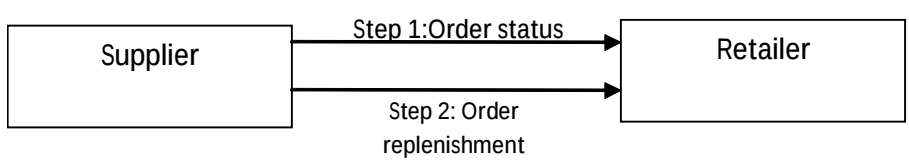


Fig: 9.9(b): Flow of Information in VMI

9.4.1 Prerequisites of VMI

For a successful VMI, the coordination amongst the various levels within the same must be strong and a high degree of

transparency to the inventory status records is necessary. A successful VMI necessitates the following:

a) Integration of all levels in the system to facilitate a smooth flow of information amongst the partners within the chain. This facilitates the free flow of inventory status and hence enables the vendor to take decisions on supply or manufacture of the products required at the customers' end.

b) The system requires a high degree of transparency of information amongst the partners. A high degree of trust is the key to a successful VMI

c) VMI helps in fairly accurate forecast of demands at the customers' end and helps in production planning and control.

d) VMI drastically reduces lead time and the administrative costs.

9.4.2 Flow of Information for VMI

A high degree of coordination is essential for implementation of VMI. Information so required may be of three levels viz.,

a) Inventory level Information: This pertains to the status of inventory at the distributors' end, the backorders, safety stock if any, etc.

b) Sales trend: This helps the distributor to predict demand that may occur. Along with the sales trend, the present sales data is useful in make production decisions.

c) Orders: This helps the distributor to coordinate manufacturing decisions to the manufacturer. This further enables the distributors for planning flow of inventory from the Distribution Centres.

9.4.3 Advantages of VMI

a) Maintenance of appropriate inventory levels at the retailers end. This reduces safety stock levels, stock outs and ensures appropriate demand supply match.

b) Maintenance of smaller batches of inventory enables reduction in holding cost and frees up retailers' inventory space

c) Provides visibility of inventory across the chain thereby helping prediction of demands, quantity of production.

d) Facilitates a close coordination across the chain, thereby resulting in a tightly integrated chain.

9.5 GREEN LOGISTICS

Green Logistics refers to logistics practices followed which are environmentally friendly and less damaging to the environment. It is the subtotal of all activities both forward and reverse which strives to create an environmentally efficient logistics. Traditionally logistics aimed at providing goods at the end of the customers' only. The consideration for disposal of the used products was not integrated in the business decision. The growing consciousness towards a clean and green earth has induced logistics processes to devise business processes whereby the products could be les detrimental to the environment.

The shortened technological life of electronic goods, the rise in frequency of disposable medical equipments, medicines, etc. have yielded in a huge amount of wastes. The concern associated is that the wastes are to be appropriately handled to minimise the impact on the environment.

Green logistics involve green manufacturing, green information system, green transportation, green packaging, etc. Green manufacturing involves manufacturing following environment friendly manufacturing processes, wherein raw materials used are friendly, and safe for use, can be dismantled for further use in other products and the life of the components, assemblies have an extended life in some or other products. Transportation modes used are to use vehicles which subscribe to pollution levels or employ modes that reduce carbon dioxide emissions. Design of products must ensure prolonged usage of the products in secondary markets by way of refurbishing. The design of products should ensure that solid waste is minimised to the best possible.

Packing materials constitute a great proportion of waste in any system. Sometimes the packaging materials are larger in contrast to the product itself. Packaging materials used should be biodegradable, reusable, and recyclable.

The integration of ERP, green suppliers have facilitated the implementation of green logistics. JIT has led to drastic reduction in wastes arising from inferior quality of products.



CHECK YOUR PROGRESS

Q 4: What is Vendor Managed Inventory (VMI)?

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Q 5: State two advantages of VMI?

.....

.....

Q 6: What is Green Logistics?

.....

.....



9.6 LET US SUM UP

After going through the unit we have learnt the following:

- Self-certified vendors certify the supplies in terms of quality, specifications, time, etc. as required by the buyer.
- Self-certification of vendors' certification is an assurance in terms of specification of the supplies provided and make facilitates a long term relationship between the vendor and the buyer.
- A Green channel Supplier is a supplier that which provides the supplies of goes in the form of spares, components, or parts directly into the assembly line.
- Green Channel Suppliers help in making the system responsive to

variations of the market and facilitates extensive goodwill of the firms.

- VMI is a forward looking initiative wherein the status of inventory at the customers/retailers' end is available to the distributor.
- VMI drastically reduces lead time and the administrative costs.
- Green logistics is the subtotal of all activities both forward and reverse which strives to create an environmentally efficient logistics.
- Green logistics involve green manufacturing, green information system, green transportation, green packaging, etc.
- The integration of ERP, green suppliers have facilitated the implementation of green logistics.



9.7 FURTHER READING

1) David Levi, Philip Kaminsky & Ravi Shankar (2008). *Designing & Managing the Supply Chain- Concepts, strategies and Case Studies*, Tata McGraw Hill, India.
2) N Rangaraj, G Raghuram& M MSrinivasan (2009), *Supply Chain Management for Competitive Advantage-Concepts and Cases,* Tata McGraw Hill, India.
3) Lee Krajewski and Larry Ritzman (2011). *Operations Management-Processes and Supply Chains*, Pearson India, India.
4) Janat Shah (2009).*Supply Chain Management-Text and Cases*, Pearson Education, India.
5) D K Agarwal, *Textbook of Logistics & Supply Chain Management* (2007), Macmillan India (P) Ltd., India.
6) S Chopra, P Meindl& D V Kalra (2013). *Supply Chain Management-Strategy, Planning, and Operation*, Pearson Education, India.



9.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Self-certified Vendors certify the supplies in terms of quality, specifications, time, etc. as required by the buyer. The process requires the vendors to obtain a self-certified vendor certificate from the buyer.

Ans to Q No 2: A green channel supplier is a supplier that which provides the supplies of goes in the form of spares, components, or parts directly into the assembly line.

Ans to Q No 3: Two advantages of self-certified vendors are:

a) Self-certified vendors streamline the business process to the extent of employing JIT manufacturing practices.

b) Such vendor continuously act upon improvise on its supplies in line with the requirements of the buyers' firm.

Ans to Q No 4: VMI is a forward looking initiative wherein the status of inventory at the customers/retailers' end is available to the distributor.

Ans to Q No 5: Two advantages of VMI are:

a) Provides visibility of inventory across the chain thereby helping prediction of demands, quantity of production.

b) Facilitates a close coordination across the chain, thereby resulting in a tightly integrated chain.

Ans to Q No 6: Green Logistics is the subtotal of all activities both forward and reverse which strives to create an environmentally efficient logistics system.



9.9 MODEL QUESTIONS

1) Discuss the role of self-certified vendors in producing an efficient supply chain?

2) Describe the process of flow of information in vendor managed inventory?
3) What are various prerequisites of VMI?
4) Discuss the contribution of green logistics in supply chain.
5) “Packing materials constitute a great proportion of waste in any system.” Discuss
6) Discuss how JIT has contributed to the growth of green logistics.

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UNIT 10: PLANNING DEMAND AND SUPPLY

UNIT STRUCTURE

10.1 Learning Objectives

10.2 Introduction

10.3 Demand Management

10.4 Demand Forecasting

- 10.4. 1 Methods of Forecasting
- 10.4. 2 Factors that reduce accuracy of forecasts

10.5 Supply Management

- 10.5. 1 Managing Capacity
- 10.5. 2 Managing inventory

10.6 Evolution of ERP

10.7 Concept of ERP in SCM

10.8 Strategies for enhanced performance of supply chains

- 10.8.1 Radio Frequency Identification (RFID)
- 10.8.2 Mass Customization
- 10.8.3 Pricing Strategies
- 10.8.4 Dynamic Pricing

10.9 Let Us Sum Up

10.10 Answers to Check your progress

10.11 Further Reading

10.12 Model Questions

10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the fundamentals of demand management
- learn the objectives of demand-supply matching in a supply chain
- explain the demand-supply match for different supply chain types
- understand the importance of forecasting in supply chain
- describe the constituents that aid in managing supply for improving performance of supply chains.

- explain ERP and its role in supply chain management
- learn various strategies contributing to success in supply chains.

10.2 INTRODUCTION

Matching supply with demand in any market is the greatest challenge in any supply chain. The same varies across product categories. Demand though is largely assessed through forecasts yet a larger fraction of it is unpredictable. Supply as such is free from variability. It is known and certain.

The objective of any supply chain in matching demand and supply follows either of the two policies:

a) Managing demand to match supply through promotion campaigns, aggregate planning strategies like backordering, price variations, etc.

b) Managing supply to match demand through backlogs, subcontracting, inventory management, etc.

The objective of demand-supply matching is achieved through a transparent and coordinated flow of information along the chain from the customers' level to the producers' and suppliers' level. Real time access to data along the chain facilitates in improving the profitability of the chain.

Matching supply with the variable demand requires the chain to be proactive to forecasted demand and reactive to variations in the forecasts. Variation of demand-supply varies across industries. For commodity products the variation between demand supply uncertainties is least owing to easy availability of substitutes. Such uncertainty is handled through an efficient supply chain. On the contrary, the uncertainty is highest for telecommunications and high end engineering equipment which is handled by agile chains. Though the demand-supply uncertainty is high for items of fashion and the mobile and PC industry, the availability of plenty of suppliers in the market reduces the uncertainties in supply. Hence, for such firms survival and growth is largely influenced by the innovative products and studies enabling assessment of fad and trends.

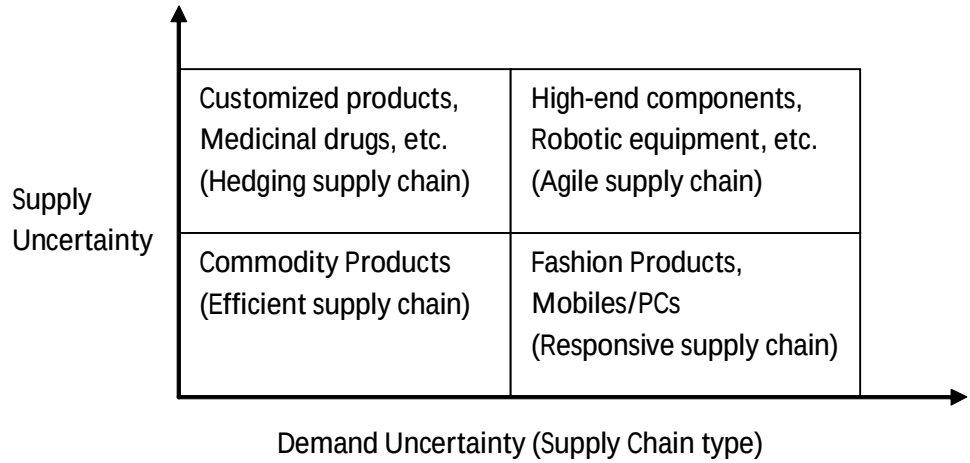


Fig: 7.2: Demand-Supply Uncertainty-Product Types

Demand management helps to reduce variations in demand and attain a robust supply chain to compensate for the variations in the forecasted data.

10.3 DEMAND MANAGEMENT

The different types of supply chains from make-to-order to make-to-stock have different points of customer orders. In each type the variation in demand is different. This is largely because the demand information in each type is modified by the actual customer demands and not by forecasts differently. Hence for each type the planning for demand is different. Since the objective of any supply chain is not to reduce costs and inventory alone but to maximize profitability, it becomes essential to control demand which is but a variable constituent in the chain. The biggest challenge to the supply chain manager lies in matching the supply with the demand. This is termed as Demand Management.

Although an assessment of the demand can be obtained through forecasts, it is not accurate to plan supply strategies. Hence firms move a step ahead and design strategies to influence end sales in the market. This is achieved by various marketing strategies such as promotional measures, pricing strategies, product introduction and withdrawal, etc. This process through which firms assess the influence of such pricing, promotional and product strategies, etc. on demand is termed as demand

shaping.

Promotional decisions influence the demand at the retailer level and such strategies are adopted at the end level. Promotional measures influence the buyers in preponing buying decisions, switch to a different product segment, contribute to impulse buying decisions, etc. An offer at higher models of vehicles attracts buyers who would have otherwise decided on buying a lower model. Discounts and End of season sales influence in impulse buying for products of seasonal nature and those in trend like apparels, footwear, etc. Discounts and combo offers in durables prepone the buying process and sometimes lead to *hockey stick phenomenon*[1] in the market. Forward buying during peak periods further adds to the variability in the demand figures as buying decision is merely shifted. The timing of offers plays a crucial role in the chain. During peak demand periods, promotional offers induce demand even though they invite more variability in demand. New product introduction through adequate promotional campaigns have been proved successful in influencing demand. Star Cement, vehicle variant launches like anniversary edition of some models, are some examples where pre- launch have contributed in estimating demand accurately. Pre-launch booking of products through ecommerce sites have facilitated in preponing the customer order points to match the demand-supply gap with no loss over obsolescence and inventory costs along the chain. Pre-booking has been successful as a strategy not only during seasons, festivals but in non-peak period also. The same has been proved through launch of apple iPhone, Redmi phones, etc.

The objective of the entire exercise is to asses demand at SKU levels at each retailer point, aggregate the same at higher levels, and finally develop aggregate level strategies of the product category.

(Footnotes)

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[1] Year-end discounts and other offers prepone buying decisions, which would have otherwise occurred in the immediately following period, may be the following quarter or the year. As a result the following period face a drop in sale. This phenomenon by which sales concentrate towards the end of a period leading to a period of slack immediately hence, is called hockey stick phenomenon.

10.4 DEMAND FORECASTING

Demand at the customer level is assessed through forecasting. Forecasting is the trigger that drives decisions of volume and types of products, inventory levels and the time of demand fulfillment. Forecast data aligned along the supply chain helps in capacity planning, promotional strategy planning, pricing decisions, etc. Demand data over a period provides various important insights about the success and /or failure of various strategies implemented over a period. Forecast data indicates various buying characteristics, the direction of growth prospects in the industry, in specific variants, regions, etc.

10.4.1 Methods of Forecasting

Methods of forecasting are of three types:

a) Time series
b) Casual or
c) Judgmental

a) Time series method uses time series to further extrapolate the data and hence predict the future based on the behaviour of the past data. Commonly used methods for time series analysis are simple moving average, weighted moving average, and adjusted exponential smoothing.

Simple moving average

The method uses demand values of the recent past to predict the same for a future period. It is useful for stable demand behaviour and is not useful to predict seasonality in patterns or trends. Moving average is normally for a defined period, usually for three-five months. For a period if the demand is D_p, and for a p number of periods, the Moving Average, M_p is calculated as:

$$Mp = \frac{\sum_{i=1}^{p} Dp}{p}$$

Problem1: Consider the following demand data for fixture type A

for eleven months- January to November. Using moving average for a three month period and five month period forecast demand for December month.

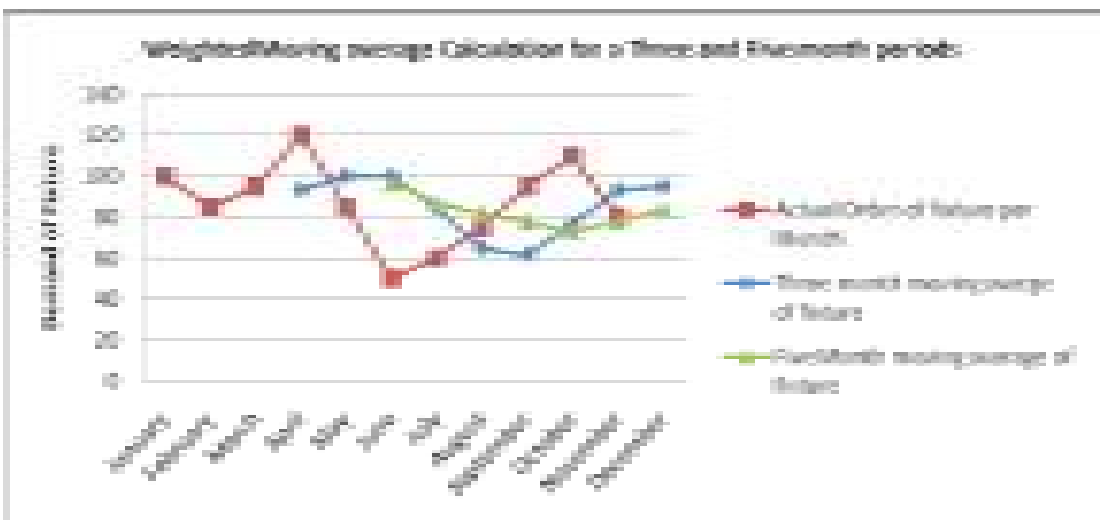
Month	Actual Order of fixture type A for each Monthof	Three month moving average fixture type A	Five Month moving average of fixture type A
January	100		
February	85		
March	95		
April	120	93.33	
May	85	100.00	
June	50	100.00	97
July	60	85.00	87
August	75	65.00	82
September	95	61.67	78
October	110	76.67	73
November	80	93.33	78
December		95.00	84

Three month weighted moving average of fixture type A for month of April

$$\text{(say)} = \frac{100 + 85 + 95}{3} = 93.33$$

All other values have been calculated hence.

Similarly the five month weighted moving average is calculated.



This method of average assigns weight to each component of the historical demand values. However the assigned weights must be a fraction of 1. The method allows assigning of higher emphasis (through weight allotment) to the most recent demand value than the earlier historical demand values of the period under study. The method is advantageous in that it lays emphasis more on the recent past data than on the earlier ones. Normally the weights are chosen by experience or trial and error methods. The greatest drawback is however in the choice of weights. Another problem in this method is the emphasis on historical data and the method of assigning weights to such historical data.

The forecast for period p can be determined as below:

$F_p = w_1 S_{p-1} + w_2 S_{p-2} + ...+ w_n S_{p-n}$

F_p = Forecast for period p

$w_1, w_2, w_3 .... w_n$ are weights assigned to periods p-1, p-2, p-3.....p-n respectively

$$\sum_{i=1}^{n} wi = 1$$

Problem 2: The sales figures for sale of stationery items for a five month period are given. It was found that the best forecast for sales has been obtained by assigning 30 % weightage to the most recent month, 25 % to data two months ago, 20 % to data of three months earlier, 15% to data of four months ago and 10 % to the data five months ago. Calculate the forecast for sales data for the month of June, if the sales values for months January through May are given as below.

Months	**Sales figure of stationery item**	**Weights assigned**
January	1105	0.1
February	995	0.15
March	1205	0.2
April	985	0.25
May	1000	0.3
June	——————————-	

Forecast for sales of stationery in June

$Sales_{June}$ = 0.1(1105) + 0.15(995) + 0.2(1205) + 0.25(985) + 0.3(1000)

= 1047

Exponential Smoothing

This method is based on diminishing of importance on historical data with the elapse of time. The older the data is, the lesser is the importance of the data in predicting a future forecast value. The method is simpler to calculate and necessitates three pieces of data, viz., the latest forecast value, the actual demand in latest period and a smoothing constant normally denoted by α. Smoothing constant α commonly takes values from 0.005 to 0.5.

The forecast for period p is given by

$F_P = F_{P-1} + \alpha(A_{P-1} - F_{P-1})$

F_P = Forecast for period p

F_{P-1} = Forecast for the previous period (p-1)

A_{P-1} = Actual demand for the previous period (p-1)

α = Smoothing constant value ranging from 0-1

Problem 3:

For α= 0.2 and for forecast and demand data for men's loafer shoes for eleven calendar months are given. Forecast the demand for the twelfth month.

Month	Forecast in 000'	Actual demand in 000'
January	1200	1290
February	1198	1195
March	1597	1705
April	2399	2110
May	1101	2100
June	2101	1130
July	1107	1290
August	1403	1310
September	1305	1000
October	1204	1420
November	2111	2150
December	??????	

Solution :

The forecast of demand for December:

= Forecast_November) + α ((Actual demand_November) – (Forecast_ November))

= 2111 + (0.2)*(2150 – 2111)

=2119

Demand forecast for December is 21,19,000 no. of loafers

b) Causal Methods of Forecasting

Causal methods of forecasting employ a method to identify factors causing an impact in the form of a relationship between the factors. The method establishes relationship between variables (or factors). Commonly used casual methods are regression, econometric models, etc. The method connects a set of independent variables and relates those with a dependent variable.

c) Judgemental methods of Forecasting

Delphi method is a popular judgemental method of forecasting. The method involves a detailed process wherein a panel is constituted of 5-7 members. The technique is popular with themes of qualitative importance and constitutes of a set of rounds in which each member answers a questionnaire or expresses his opinion on a theme. At the end of a round a facilitator summarizes the opinions of the members, moderates the same and circulates to all the members to revisit their individual opinions based on the comments of the other members. Anonymity is maintained among the opinions of the members. After a number of rounds the opinions take a shape for attaining consensus. The role of the facilitator is very crucial in this technique. He may prove to be instrumental in presenting the summary accurately or gets the opinions skewed towards his personal opinion.

10.4.2 Factors that reduce accuracy of forecasts

a) Long lead times- longer the lead time, more is the error since the forecasts made pertain to a time ahead of the actual period

of sale. The period of actual sales might have other factors such as govt. regulations, seasonality, etc. in influencing demand.

b) Type of products-products with short product life cycles move into obsolescence faster hence forecast data are rarely pertinent.

c) Forecast not based on end customer demand generally are inaccurate owing to bull whip effect.

Implementation of IT in supply chain has extensively eliminated errors in forecast through a transparent flow of information along the chain. Real time access to customer data has helped in aligning demand-supply conveniently.



CHECK YOUR PROGRESS

Q 1: What are the policies of matching demand-supply in a supply chain?

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Q 2: What are the advantages of demand management in a supply chain?

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Q 3: What is Demand Management?

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Q 4: Mention three methods of forecasting?

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10.5 SUPPLY MANAGEMENT

Managing supply in a supply chain involves managing two relevant components together or in isolation as below.

a) Capacity and b) Inventory

10.5.1 Managing Capacity

Managing capacity of production to meet variability of demand is achieved through modifying the capacity of a manufacturing facility as per forecast or actual customer demands. Managing capacity is performed through managing time or workforce or facility capacity.

a) **Managing Time:** The production capacity of a plant is available for 24 hours each day. Normally plants do not run 24 hours but for 8-hour shift of the manpower involved. Requirement of additional production from the plant can be met out by running the plant for hours additional to the normal production time of 8 hours. The manpower in such a case can be made to work overtime for running the plant. Available capacity can be made flexible to accommodate demand through overtime variation. Furthermore engaging part-time workforce beyond allowable overtime hours for the regular staff can facilitate increase of production hours. On the contrary, flexible staff can be used for running the plant where demand shows huge fluctuations. Hospitals and process industries use workforce in two/three shifts for adequate capacity utilisation for matching demand.

b) **Managing workforce :** During periods of high demand, firms use a strategy called hire and fire. The firms in such cases engage a flexible workforce during high demand period and fire the temporary workforce during slack demand period. The tea industry woks in this strategy.

c) **Managing facility capacity :** In the event of very high demand that cannot be served by running the facility through permitted overtime and additional shifts, the firm manages to match demand by subcontracting. Subcontracting enables the firm to maintain a relatively inflexible production plan and helps to optimize costs.

10.5. 2 Managing inventory

Stock out is an expensive term. It causes loss of goodwill, induces product switching, and costs brand loyalty. Availability on-the-shelf cannot is hence critical to the PLC curve. Effective management of availability in requisite variety, volume, location is achieved through one or a combination of the strategies below.

a) **Standardization of components :** Use of common components and parts for different variants reduce the variability in demand of the component. Variant level demand though displays variability, yet the demand for components is relatively stable. Supply of such components can easily match demand. This is popularly known as modular design in components that helps in attaining wide variety with a few variant of components. This is particularly useful in assemble-to-order and customized products. The advantage lies in better managing the supply chain since the chain handles fewer variants of inventory along the chain. Dell has been able to provide a wide variety of customized PCs by use of standardized components.

b) **Inventory build up :** Demand for certain variants are relatively stable. Some variants have specific set of customers with known demand patterns. Such products can be produced during off-peak seasons, relieving the capacity for managing variable and unpredictable demand. This is particularly suitable for make-to-stock type products.

10.6 EVOLUTION OF ERP

ERP is an abbreviation for Enterprise Resource Planning. As evident in the name, it is a concept wherein resources within an organisation are integrated to achieve effective utilisation for improved business performance. The process requires integration of all the functional divisions and business processes from the stage of customer interface to the stage

of sourcing resources at the production stage. Primarily ERP integrates all the stages, functional divisions through availability of information on real time across the organisation. ERP packages were initially based on Manufacturing Resource Planning (MRP) concepts as the need evolved from the latter. Planning for resources at the manufacturing level necessitated balancing of resource and capacity planning with the demand data, actual orders, order status, etc. Inaccurate data at the production floor introduced mismatch of production with demand requirements leading to high inventories, nonalignment of order delivery schedules, obsolescence etc. Till 1970 techniques were used for aggregate planning strategies, eventually by 1980 the focus shifted to Manufacturing Resource Planning (MRP II). MRP II supports all business operations within the organisation moving ahead of raw material planning at the shop floor level. An enterprise wide integration has been initiated through integration of engineering, sales and distribution, finance, etc.

ERP is instrumental in improved business performance through flexible market through facilitation of integrated real time decision support. ERP systems provide better analysis of data from a variety of sources and enables comprehensive decision making.

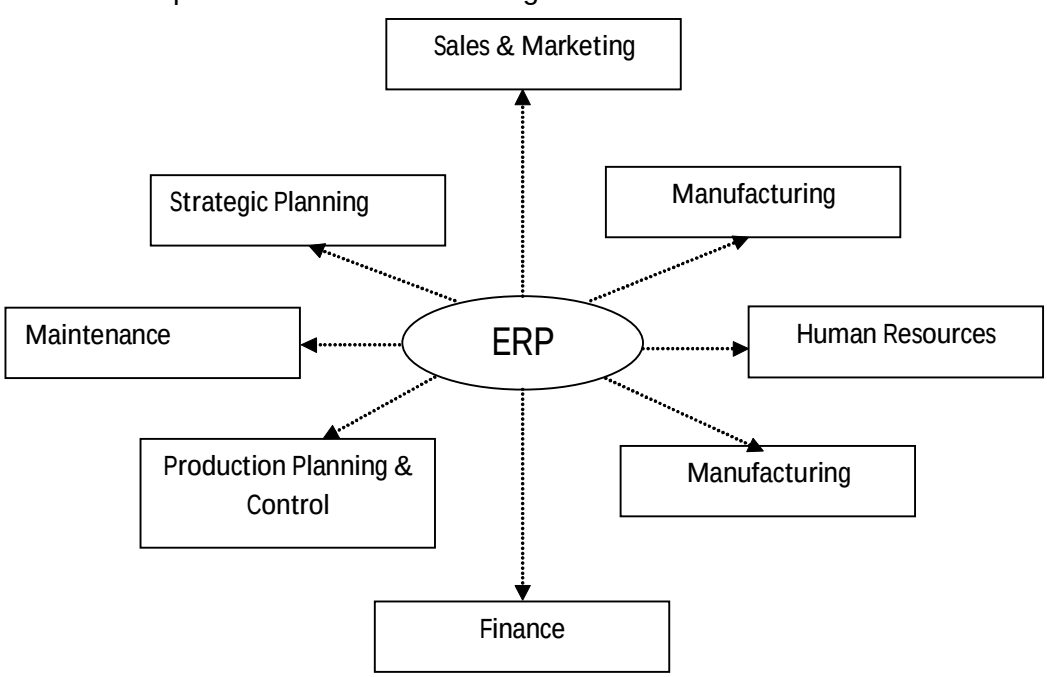


Fig: 7.6: ERP- Integration

10.7 ERP IN SUPPLY CHAIN MANAGEMENT

Notwithstanding the type of supply chain and the products therein, transparent flow of information across the board is essential. The accurate information flow provides agility in the chain making it responsive to the variations in the market. The advantages of ERP implementation in supply chain is delineated as below.

a) Lead Time:

ERP systems integrate sales and distribution module with manufacturing. No sooner orders are received at the sales end, a set of activities are triggered by virtue of the same. The finished goods inventory status is checked to fulfill the orders received which is found unavailable triggers actions for manufacturing of the same. The requirement of demand is percolated to the suppliers who in turn are informed of the need of material supply at the production point. Consequently, purchase orders are issued to the suppliers and payments follow accordingly.

b) Cycle Time:

Prior to ERP system implementation, orders received had to progress through various stages within the supply chain from the retailer, distributor, assembler, manufacturer, etc. Flow of the information of orders received moved in phases from one stage to the other. At each stage order quantity and variety is received from the preceding stage with inputs from the previous stage. Many a time figures were inflated in anticipation of further variations in the customer levels. The stage wise flow itself was an elongated process. Decisions were triggered at each stage through order status received from the preceding stages adding to elongated cycle times. As a result of ERP ease in flow of real time accurate order information, reduced cycle time to as much as 50 %.

c) Agility and responsiveness

Real time access to demand data facilitates in streamlining the production plan and integrates with suppliers to adhere to lead time while providing the right product at the right time and variety. Configure to order, mass customisation is possible only because of preponing customer order

points and sharing the demand details with the OEMs and suppliers.

d) Capacity Utilisation

Real time demand data access provides adequate aid in capacity planning at the shop floor. Decisions of subcontracting, overtime can be initiated without delays since forecast data and actual demand data are available. This ensures customer goodwill and loss due to underutilization of capacity.

e) Reduced processing costs

ERP implementation in supply chain integrates partners along the chain with information. The integration reduces costs of processing at each stage of the chain. Transaction costs are reduced making the process of information flow fast, easy and simple.

10.8 STRATEGIES FOR ENHANCED PERFORMANCE OF SUPPLY CHAIN

10.8.1 Radio Frequency Identification (RFID)

RFID is a technology that uses tags emitting radio signals called RFID tags. It is used for identification of materials, equipments, etc. for identification inside commercial and industrial work places. The same tag is used for identification at the customer end. Hand help RFID reader devices are used to uniquely identify the material or a batch of products at the customers' end which when fed to a central network helps in linking with an associated database containing the specifications of the manufacturing details, etc. RFID tags provide access point of sale (POS) data across the chain. It is extensively used in package tracking, product tracking, warehouse management stores, etc. The advantage of such tags is in accurate real time information that can be shared across all vendors for ensuring a robust supply chain. RFID tags have eliminated the human intervention in materials movement thereby elimination errors largely.

7.8. 2 Mass Customization

Mass production has inherent advantages of economies of scale, inflexibility in production other than the volume, cost effectiveness, etc. The risks of trends and changes in taste and preferences are however present. Along with these, supply chains are better managed which operate with aggregate level forecasts and not POS forecasts. Preponing the customer order point have added advantages. These have facilitated in encouraging production of products with inputs and specifications from the customers. The usage of standardized equipments and modular manufacturing have enabled in providing high volume customized products. Real time customer order status, specification, and availability of standardized equipments have been the key determinants to mass customization. Dell computers have been providing mass customized PCs through usage of standard components.

7.8.3 Pricing Strategies

As detailed in the unit earlier, strategies of varying demand, for matching demand-supply within a chain includes various pricing strategies. Differential pricing is practiced to target products to different segments according to respective price sensitivities. Popular differential pricing strategies are as below:

a) **Group pricing:** Price is set with discounts for a specific group such as students, senior citizens in restaurants, etc.

b) **Time based pricing:** Time based pricing is commonly practiced these days in ecommerce sites and in departmental stores. McDonalds Happy hours, and discount during late and early hours of the day are some such examples. The technique is used to attract price sensitive customers. An added advantage to this is to smooth demand along a period.

c) **Product versions:** This policy is to differentiate the products

on small variations to target different customer categories. Though the variation is small and the cost incurred thereupon is minimal yet the positioning is such that the product is perceived as widely different one or an upscale one. Real Fruit power and Fibre active variants of Real fruit juice, Xtra Premium Motor Spirit, salt free Amul butter are such examples using the strategy.

7.8. 4 Dynamic Pricing

Though the term includes pricing, it is not influenced by price sensitivity. The primary premise of it is on demand adjustments along a period to relieve the supply chain of frequent variations of high demand and low demand. The policy lures customers to shift the time of purchase to non - peak periods. Low tariffs of mobile network during off peak hours, 'sabsasasta Wednesday' are some examples implementing the strategy.



CHECK YOUR PROGRESS

Q 5: What are the options in managing the capacity of a plant for demand-supply matching through supply initiatives?

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.....

Q 6: What is the full form of ERP?

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.....

Q 7: On what frontiers does ERP aid supply chain?

.....

.....

Q 8: What are the different pricing strategies in use for a cost optimized supply chain?

.....

.....



10.9 LET US SUM UP

After going through the unit we have learnt the following:

- Demand is assessed through forecasts, yet a larger fraction of it is unpredictable. Supply as such is free from variability. It is known and certain.
- Real time access to data along the chain facilitates in improving the profitability of the chain.
- The process through which firms assess the influence of such pricing, promotional and product strategies, etc. on demand is termed as demand shaping.
- Forecasting is the trigger that drives decisions of volume and types of products, inventory levels and the time of demand fulfillment.
- Forecast not based on end customer demand generally is inaccurate owing to bull whip effect.
- Though variant level demand displays variability, the demand for components is relatively stable.
- ERP integrates all the stages and functional divisions through availability of information on real time across the organisation.
- RFID is a technology used for identification of materials, equipments, etc. for identification inside commercial and industrial work places.
- Differential pricing is practiced to target products to different segments according to respective price sensitivities.



10.10 FURTHER READING

1) Lee Krajewski and Larry Ritzman (2011). *Operations Management-Processes and Supply Chains*, Pearson India, India

2) Janat Shah (2009).*Supply Chain Management-Text and Cases*, Pearson Education, India

3) D K Agarwal, *Textbook of Logistics & Supply Chain Management* (2007), Macmillan India (P) Ltd., India

4) S Chopra, P Meindl& D V Kalra (2013). *Supply Chain Management-Strategy, Planning, and Operation*, Pearson Education, India.

5) Leon Alexis (1999). *Enterprise Resource Planning*, Tata McGraw Hill Ltd., India

6) M Jaiswal & G Vanapalli(2006). *Textbook of Enterprise Resource Planning*, Macmillan India Ltd., India



10.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The policies of matching demand and supply in a supply chain are:

a) Managing demand to match supply through promotion campaigns, aggregate planning strategies like backordering, price variations, etc.

b) Managing supply to match demand through backlogs, subcontracting, inventory management, etc.

Ans to Q No 2: Demand management helps to reduce variations in demand and attain a robust supply chain to compensate for the variations in the forecasted data.

Ans to Q No 3: Demand management is the strategy a supply chain employs to match demand and supply along the chain.

Ans to Q No 4: Methods of forecasting are of three types:

a) Time series

b) Casual or

c) Judgmental

Ans to Q No 5: Managing capacity for managing supply can be achieved through the following

a) Managing time of operation of the plant.
b) Managing workforce employed in the shop floor
c) Managing capacity utilization

Ans to Q No 6: The full form of ERP is Enterprise Resource Planning

Ans to Q No 7: ERP aids the supply chain on the following aspects:

a) Reduction of cycle time
b) Reduction of lead time
c) Agility and responsiveness in the chain
d) Effective and efficient capacity utilisation

Ans to Q No 8: The different pricing strategies in use are:

a) Dynamic pricing strategy
b) Group pricing
c) Time based pricing
d) Product versioning



10.12 MODEL QUESTIONS

Q 1: Demand-supply matching for different types of supply chains is different. Justify.

Q 2: What is demand shaping? How do promotional campaigns influence demand for demand-supply chain in a supply? Elucidate with an example.

Q 3: What are the different types of time- series forecasting techniques?

Q 4: What are the causes of erroneous forecasts figures of demand? How can those be eliminated?

Q 5: Managing workforce helps to manage capacity of a plant. Discuss.

Q 6: Discuss the importance of ERP in Supply Chain Management.

Q 7: State the importance of RFID in SCM.

Q 8: Why is mass customization an advantageous option than mass production?

*** ***** ***

UNIT 11: PROCUREMENT AND INVENTORY MANAGEMENT

UNIT STRUCTURE

11.1 Learning Objectives

11.2 Introduction

11.3 Objectives of Procurement and Inventory Management

11.4 Essentials of an Efficient Procurement and Inventory Management System

11.5 Procurement Cycle in Supply Chain

11.6 Inventory Management

- 11.6.1 Types of Inventory
- 11.6. 2 Functions of Inventory

11.7 Inventory Costs

11.8 Types of Inventory Models

- 11.8.1 Model I-Basic EOQ
- 11.8.2 Model II- EOQ model with planned Shortages or stock-outs
- 11.8.3 Model III- Manufacturers' model or production model

11.9 Inventory Control Systems

- 11.9.1 ABC analysis
- 11.9.2 VED Analysis
- 11.9.3 FSN analysis
- 11.9.4 SDE Analysis

11.10 Tools of Inventory Management

11.11 Let Us Sum Up

11.12 Answers to Check Your Progress

11.13 Further Reading

11.14 Model Questions

11.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the importance of procurement function in a firm

- learn the objectives of procurement and inventory management
- understand the prerequisites of an efficient procurement and inventory management system
- learnabout the various types of inventory in use in a firm.
- understand the different types of inventory costs and inventory models, the assumptions and the formulae.
- describe the various inventory control systems
- explain the tools of inventory management.

11.2 INTRODUCTION

Procurement or Purchasing is a function within a firm which integrates and coordinates with external vendors for supply of materials, components, parts, machinery, etc. It serves as a linkage between the firm and the suppliers for smooth flow of inventory along the supply chain.The function is a staff function which executes purchase contracts with the vendors. The heart of any supply chain is a well-coordinated supply chain from the POS to the manufacturers' end. Since firms confine to core business process, a number of process including equipment and component manufacturing is sourced from external vendors. A tightly integrated chain works in close coordination along the chain to minimize costs of inventory, cost of productions, costs of supplies, etc. Rise in costs arises out of high storage of inventory, movement of inventory, stock outs, etc. The coordinating among partners within a chain is a necessity for inventory management in the chain. The coordination in the chain is the enabler for a balance of supply and demand handled through efficient inventory management. The accurate demand data which flows along initiates supply of right variety, quantity, and locations. The rising costs of holding inventory, reduced order delivery times, Just in Time (JIT) all add to maintaining a low inventory status, the benefit of which is received as optimized cost and enables providing products at competitive prices. ERP applications have made real time flow of POS data, eliminating effects of bull whip effect which is otherwise extensive within a supply chain. Inventory decisions in terms of the quantity, variety and the stage of holding have

significant impact on the responsiveness of the firm. Firms tend to make a trade-off with the quantity and stage of holding inventory with risks of obsolescence, damage in transit and/or storage, and stock-out.

11.3 OBJECTIVES OF PROCUREMENT AND INVENTORY MANAGEMENT

The objectives of procurement and inventory management are as below:

a) Procurement of the desired materials in right quantity, time and of the right quality
b) Purchase, receive and arrange for flow of materials along the chain
c) To tap market fluctuations and manage inventory to respond to such fluctuations
d) Integrate with the vendors for on time delivery of material in the desired form and quantity
e) Reduce costs of inventory along the chain
f) Arrange for transportation of material produced or received from vendors to the production sites or the distributors for onward flow.

11.4 ESSENTIALS OF AN EFFICIENT PROCUREMENT AND INVENTORY MANAGEMENT SYSTEM

The prerequisites of an efficient Procurement & Inventory Management system are:

a) POS data: Sales data is the most important feeder into the procurement and inventory management system that initiates the sequence that follows. Inventory flow decisions along the chain are determined by the actual sales data. Whenever required the same is essential to initiate orders of supplies from vendors or for production decisions
b) Materials Requirement Planning(MRP): A sound MRP ensures smooth planning of raw materials, assemblies, and sub-assemblies as per Bill of Materials to produce or procure from vendors. The same serves

as a feed tothe Manufacturing Resource Planning (MRP II). Plans to meet planned customer orders aresmoothly carried through sound MRP and MRP II.

c) Coordination with vendors: A cordial relationship with vendors provides the cooperation of the suppliers to meet all variations that may enter along the chain at different stages. A cordial relation goes a long way in successfully aligning the strategies of cost optimization and customer relationship management of the firm. The same enables in practicing Just-in-Time (JIT) to work with effectively zero inventorythereby curtailing cost to the maximum.

11.5 PROCUREMENT CYCLE IN SUPPLY CHAIN

Procurement is the process wherein a firm purchases raw materials, components, semi-finished goods for further processing and/or marketing and distribution. Procurement in addition to purchase also places orders, follow ups and performs the necessary expediting of orders.

Generally speaking, the procurement section in a firm initiates orders based on forecast, actual sales data, back orders, etc. The section identifies eligible vendors for supply of the orders of the specifications in the requisite time. Orders are then placed and afternecessary follow-ups, the materials are received and directed onward into the specific departments for further processing.

The steps in the procurement cycle are as below:

a) The need: The necessity of a product comes from inventory status of the same. It may be the POS data, the shop floor, or the maintenance section. As the user (here it could be the retailer, the maintenance department or the production department) initiates the need, the specifications of quality, quantity, etc. are also obtained for onward processing.

b) Requisition: Requisition is the order for the purchase. Upon approval from the respective authority, the order is generated for placing to the vendors. The value of the purchase and the policies of the firm determine if purchase should be made through tender process.

Otherwise for repeat orders pre-decided vendors are chosen and the price is set through negotiation and the orders are placed.

For purchases requiring tender, a Request for Proposal is prepared containing specifications to be met in the supplies and tenders are invited from eligible vendors by intimating in public domain like newspapers, websites, etc.

c) On receipt of the tenders, technical andfinancial assessments are done to evaluate all the bidders upon fulfillment of requisite technical specifications.

d) The terms and conditions are negotiated upon and the price is fixed, the contract is awarded and period of order is specified.

e) The purchase records are updated with the description of the vendor chosen.

f) Upon delivery of the goods, the goods are inspected and thereafter received along with the invoices.

g) Payments are cleared within specified period as per the terms negotiated.

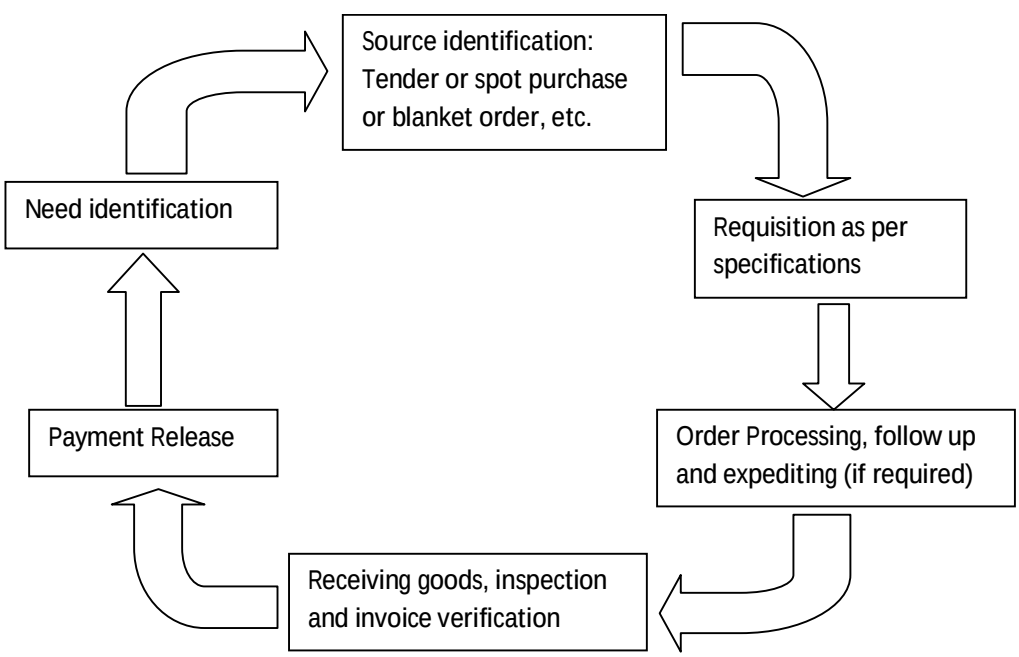


Fig 11.1: Procurement Cycle

Types of Purchasing

Purchasing in a firm can be of different types based on the nature

of business of the firm, the type of material or components to be purchased, the order value, etc. Purchasing as such may be done in a variety of ways. Some common purchases are as below.

a) Spot Purchase
b) Zero Stock Buying
c) Blanket Orders
d) Rate Contract

11.6 INVENTORY MANAGEMENT

In supply chain parlance, inventory refers to all raw materials, semi-finished goods, finished goods which are idle and awaiting sale or processing for value addition in form. Inventory also includes tools, spares, and safety stock maintained to prevent stock outs. Inventory is the sum total of material in different forms maintained at hand to meet unexpected demands

11.6.1 Types of Inventory

Inventory used within a firm can be classified as below:

a) Production Inventory: Raw materials and other components that are directly used in the production process are called production inventories. Production inventory can be semi-finished goods supplied by vendors along with raw materials.
b) In-process Inventory: These are partially finished goods at different stages of the chain.
c) MRO Inventory: MRO refers to maintenance, repair and operating supplies that are essential for the smooth operation of a production yet do not form a part of the manufacturing process. These include lubricants, spares, etc.
d) Finished Inventory: The finished goods at the end of a production process ready for sale are the finished inventories.

11.6.2 Functions of Inventory

As materials, semi-finished goods, finished goods flow along a supply chain from one stage to another; a continuous flow of inventory exists within the chain. Inventory represents an important factor influencing the performance of the supply chain in its responsiveness and agility.

Inventory handles variations of actual demand against forecasts. It eliminates risks of stock-outs on elongation of replenishment lead times. Inventory helps to shield against the uncertainties of in-transit delays and damages and keeps the process move without halts of production delays, transit delays, and uncertainties of demand fluctuations. It strikes the tradeoff between demand and supply. Based on the purpose served inventory can be classified as below.

a) Cycle Inventory

The inventory that is available for fulfilling regular sales at the POS for normal demand is called cycle stock. It includes finished goods inventory at the shelves and those in the stock area of the stores. It includes the inventory between an order received and the subsequent delivery of the same. It is planned to meet all demands excepting for safety stock.

b) Safety Inventory

As the term suggests it is used to meet all sudden variations of demand or delays of replenishment in order to prevent stock outs. The cost of stock outs is extremely high. It could lead to loss of goodwill, brand switching, and disrupt brand loyalty. Hence to safety stock is maintained based on demand variations, lead times and planned availability on the shelves.

c) Decoupling Inventory

Decoupling inventory enables each stage of the chain to operate independently of the inventory status of other stages. It is practically impossible to operate the entire supply chain based on

inventory decisions in integrated fashion all along the chain. Each stage hence maintains certain inventory to run its operations independent of the preceding and succeeding stages. Such inventory enables the stages to operate as independent decision units and optimize the performance.

d) Pipeline Inventory

It is the inventory in-transit or the work–in-process within a chain. It consists of inventory on the move from one location to another. Since it is practically not possible to have zero lead time, hence pipeline inventory comes into existence. Faster modes of transport and reduced lead time help to reduce pipeline inventory.

e) Anticipation inventory.

Inventory maintained to handle high demands, inconsistency in production, eventualities of labour strikes, natural calamities, etc. is called anticipation inventory.

f) Dead Inventory

It refers to the nonmoving component of inventory. It includes items of obsolescence owing technological upgradations, changes in trends, tastes, etc. Dead inventory should at best be avoided and should be disposed off at intervals.

11.7 INVENTORY COSTS

Inventory strikes the balance between demand and supply variations at the POS. Hence, maintenance of adequate inventory is required. However, inventory involves costs of various types. The cost of the inventory along with the costs of holding it adds to cost in the supply chain. Yet it cannot be eliminated overall. Inventory is a necessary evil. The elements of inventory costs are as below:

a) Ordering Costs

i. Costs of placing an order, costs of time involved, paper works associated

ii. Costs of invoice pricing, payment processing, approvals, etc.

iii. Costs of receiving, inspecting, and recording receipt of goods,

billing,etc.

b) Carrying costs.
   i. Costs of holding inventory per unit as a function of time
   ii. Costs of obsolescence, damage during storage, pilferage, etc.
   iii. Costs of insurance of the goods held.
   iv. Cost of capital owing to holding the inventory

c) Stock-out costs
   i. Costs of stock-outs arising out of delayed delivery of goods and delays in production
   ii. Costs of stock-outs arising out of backorder cost, loss of potential sale due to changes of demand trends, fad, etc.
   iii. Delayed delivery owing to acts of nature and in-transit damages, etc.

Inventory costs rise with carrying costs and hence with the volume of inventory. The lesser the inventory maintained better it is. However low levels of inventory lead to frequent placement of orders and as such the procurement rises. A plot of procurement costs, holding costs and stock out costs as presented below.

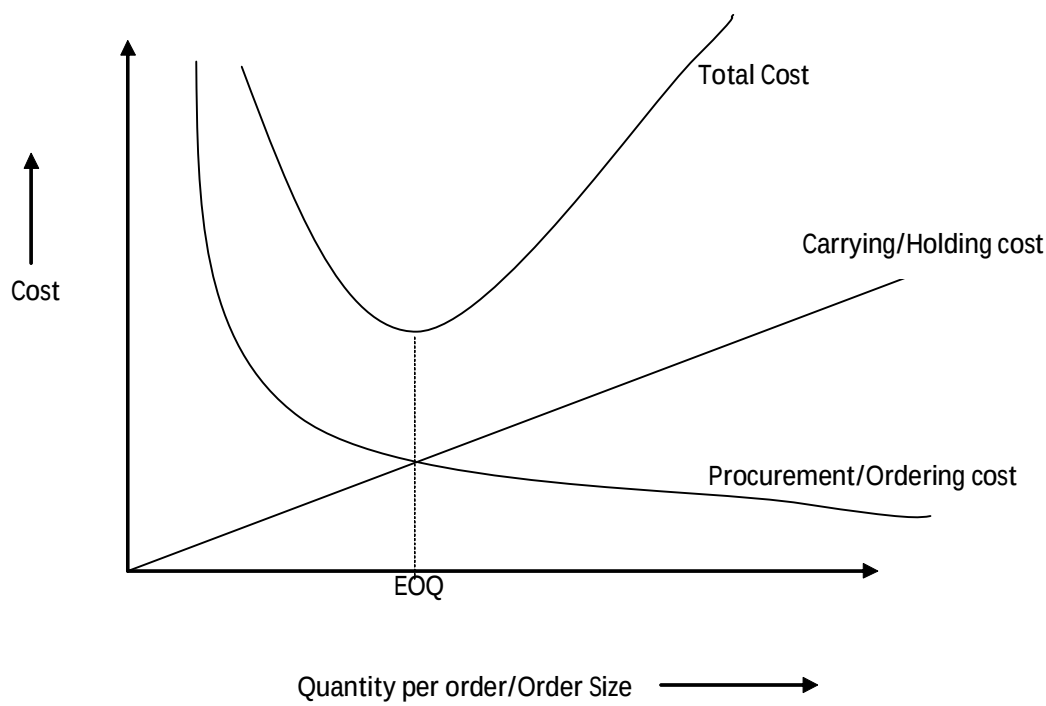


Fig: 11.2 Plot of Costs and quantity



CHECK YOUR PROGRESS

Q 1: What is Procurement?

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Q 2: State three objectives of Procurement and Inventory Management.

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Q 3: State some common types of purchase in a firm.

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.....

Q 4: What are the different types of inventory in use in a firm?

.....

.....

Q 5: What are the constituents of carrying costs?

.....

.....

11.8 TYPES OF INVENTORY MODELS

Inventory maintained in a firm needs to be just right for the supply chain to be efficient and eliminate costs of loss of goodwill. Though there is no specific prescription as to how much of inventory is right to be held in a chain, yet a number of mathematical models have been used to justify the right amount of inventory. The primary backdrop of the formulation of the models have been two components viz.,

a) The quantity to be ordered every time an order is placed called the Lot size and

b) The time of placing orders called Reorder Point

The models are used to determine lot size and reorder point. Common models for determination of the two components are as below:

11.8.1 Model I-Basic EOQ

The basic EOQ model is also known as the Retailers' model of EOQ. It is based on the following assumptions.

a) The annual demand, carrying cost, and the ordering cost can be determined.

b) The demand is constant over the entire period.

c) The lead time is constant and known.

d) There are no stock-outs in the entire period. The order quantity is replenished instantaneously on exhaustion.

e) There are no quantity discounts anywhere during the period

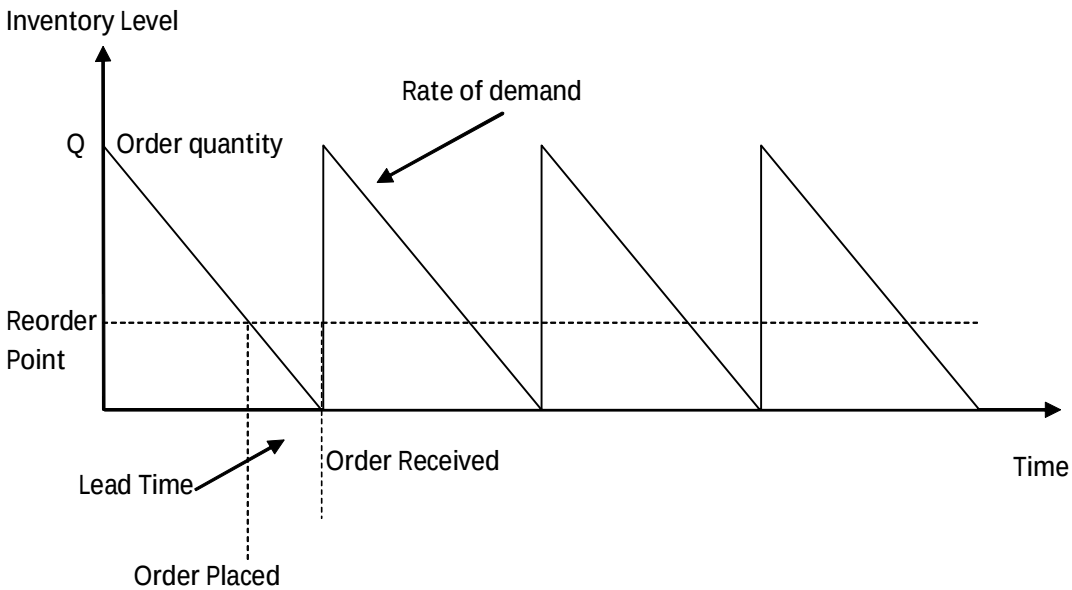


Fig: 11.8.1: Basic EOQ model

Let S= annual demand for a product

Q= quantity ordered per order

C= holding cost per unit per year

O= cost of placing one order

Annual holding cost = C x Q/2

Annual ordering cost = Order per year x Ordering cost

= S/Q x O

For minimal total cost per year, the quantity to be ordered $Q = \sqrt{\frac{2SO}{C}}$

The average inventory level = average of maximum and minimum inventory $= \frac{(Q+0)}{2} = \frac{Q}{2}$

Problem 1: In a plant, the annual demand for limestone is 600 T, the cost of ordering is Rs. 150 per order. The cost of holding is 5% of the cost of the material which is Rs.500 per Kg. Calculate the EOQ.

Solution:

S= 600,000 Kg

O = Rs.150

C = 0.05 x 500

EOQ Q $= \sqrt{\frac{2SO}{C}}$

$= = \sqrt{\frac{26\times00000\times150}{25}}$

= 3000 Kg = 3T

11.8.2 Model II- EOQ model with planned Shortages or stock-outs

In this model stock-outs are allowed leading to back order. The customer is willing to wait till the order is replenished.

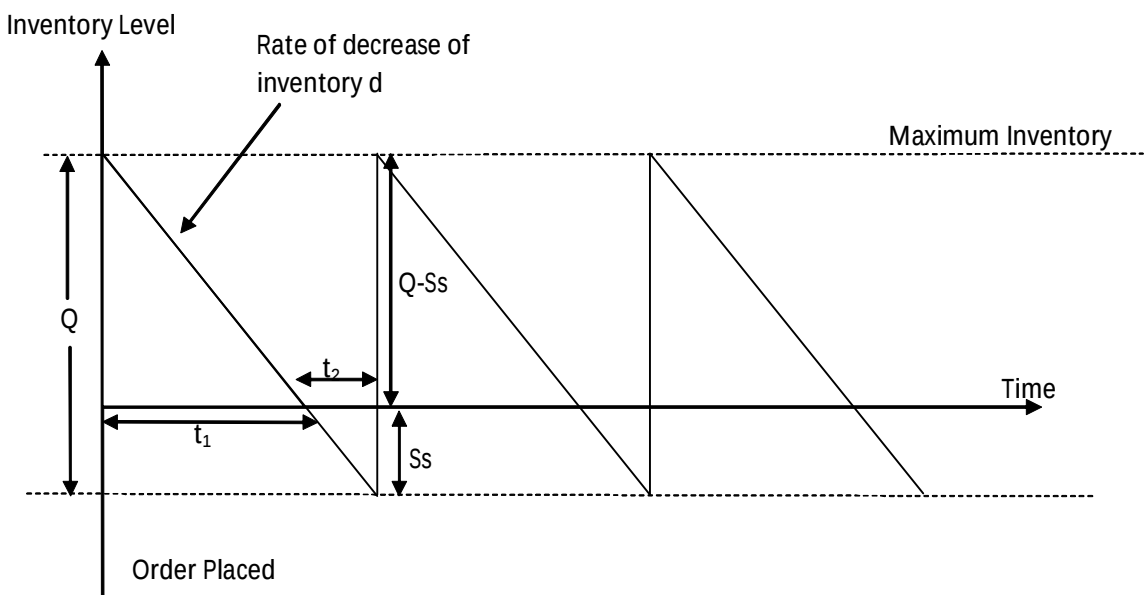


Fig: 11.9.2: EOQ model with planned shortages

Let S = annual demand for a product

Q = quantity ordered per order

C = holding cost per unit per year

O = cost of placing one order

Ss = items for fulfilled back order

Q-Ss = Quantity that lasts without shortage i.e. for time t_1

Ss = Quantity to meet shortage, i.e. quantity for time t_2

k = Cost of shortage per unit per year

Annual holding cost = C x Q/2

Annual ordering cost = Order per year x Ordering cost

= S/Q x O

For minimal total cost per year, the quantity to be ordered

$$Q = \sqrt{\left(\frac{2SO(C+k)}{Ck}\right)}$$

Safety stock $Ss = \frac{CQ}{C+k}$

Problem 2: In a mobile repair shop, the proprietor follows a policy of back ordering to get rid of rise in pilferage of parts. The holding cost is Rs. 1000 annually. The cost of placing an order is Rs. 60 per order. The cost of shortage per item is Rs. 400. The annual demand for the parts is 200 units. Calculate the EOQ.

The quantity to be ordered $Q = \sqrt{\left(\frac{2SO(C+k)}{Ck}\right)}$

The quantity to be ordered $Q = \sqrt{\left(\frac{2\times 200\times 60(1000+400)}{1000\times 400}\right)}$

= 9 units

11.8.3 Model III- Manufacturers' model or production model

In this model production is carried out in batches or lots. As a result inventory builds up during production till it reaches the total size of the batch/lot. The model is based on the following assumptions:

a) Production of items is not continuous but in batches/lots

b) The annual demand is known and distributed uniformly along the period.

c) Sales do not begin after the batch /lot has been produced in entirety. Sales and production occur simultaneously.

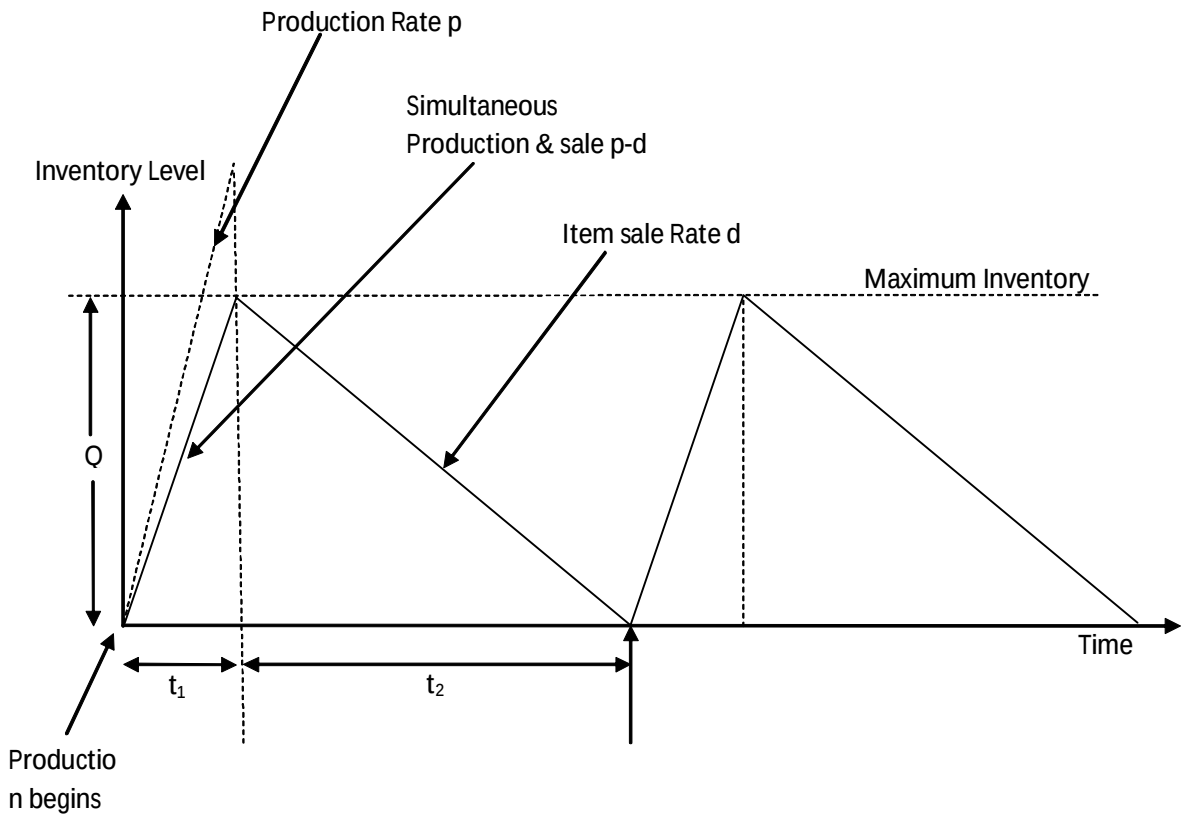


Fig: 11.9.3: Production model

Let S= annual demand for a product

Q= quantity ordered per order

C= holding cost per unit per year

O= cost of placing one order

St = No. of set ups for production

Sc = Set up cost per set up or per run

Duration of production run = Q/p units per day

Maximum units in inventory per production run $= \frac{Q}{p}(p - d)$

$$\text{Average Inventory} = \frac{1}{2}\frac{Q}{p}(p-d)$$

Total set up cost = No. of set ups for production x Set up cost per set up or per run

= St x Sc /Q

For minimal total cost per year, the quantity to be ordered

$$Q = \sqrt{\left(\frac{2St \times Sc \times p)}{(p-d)C}\right)}$$

11.9 INVENTORY CONTROL SYSTEM

Inventory Control is necessary in a firmas it is essential to ensure smooth flow along the chain without halts of stock-out and lead times. It ensures cost optimization and reduced loss of inventory in the chain. Nature of control of inventory is peculiar to the characteristics of the items. In fact the control required is a determinant of the priority of importance and usage of the item within the firm.

For the purpose of control, items are classified based on certain criteria which vary for different analyses. Some commonly used control approaches are detailed below.

11.9.1 ABC analysis

In this analysis, the items are classified based on their usage value over a period of time, usually a year. The usage value is plotted to obtain a curve called the curve of maldistribution. The annual usage value for each item is calculated and arranged in descending order followed by the cumulative usage value. The percentage of the aggregate usage value is obtained and plotted. The plot so obtained is as below.

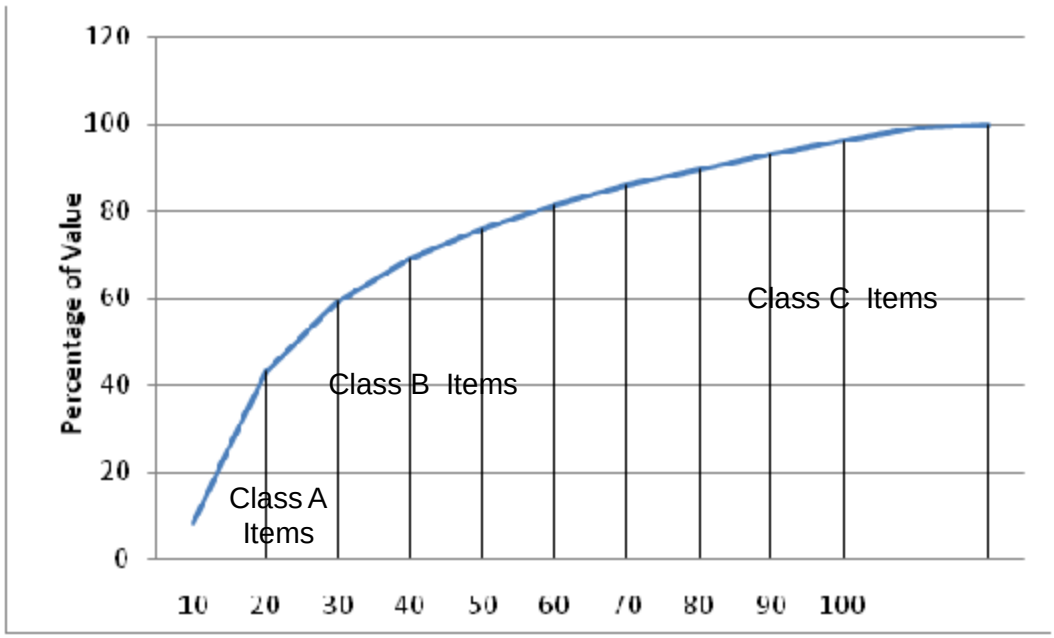


Fig: 11.9.1: ABC classification of items

Problem 3: For a set of twelve items in a production centre, the number of units required and the cost per unit are provided. Perform an ABC analysis to find out the A category items.

Item Codes	Units Required	Unit cost in INR
1	233	15
2	800	9
3	50	30
4	20	66
5	1267	4.5
6	1333	1.5
7	2000	0.6
8	100	10.5
9	10	24
10	967	1.2

Solution:

The annual usage and the respective percentage of usage are calculated as below:

Item Codes	Units	Unit cost in INR	Usage in INR	Percentage	Cumulative Value %	Category
1	233	15	3500	14	14	A
2	800	9	7200	29	43	
3	50	30	1500	6	49	
4	20	66	1320	5	54	
5	1267	4.5	5700	23	77	B
6	1333	1.5	2000	8	85	
7	2000	0.6	1200	5	90	
8	100	10.5	1050	4	94	
9	10	24	240	1	95	
10	967	1.2	1160	5	100	C
		Total	24870	100		

11.9.2 VED Analysis

VED classification is made on the criticality of importance in the production process. V stands for Vital, E Essential and D Desirable. V category items are so vital that the absence would bring the production process to a halt. Essential items hamper the efficiency of the process. While Desirable items are those which though required, yet the absence does not lead to loss of production. The analysis is used for inventory control of spare parts.

11.9.3 FSN analysis

The pattern of usage of items or the consumption is fed to classify items as FSN. F-Fast-moving, S- Slow-moving, and N-non-moving reflect the pattern the items move off the shelves. The rate of flow determines the necessity and pattern of replenishment of the items and handling in the supply chain.

11.9.4 SDE Analysis

The analysis is based on the availability of items. S-Scarce,

D-Difficult and E-Easily available refer to the convenience of availability of the items in the markets. Those scare ought to be rare and hence need to be maintained high in inventory.

11.10 TOOLS OF INVENTORY MANAGEMENT

Inventory management tools help to reduce inventory, ensure smooth flow along the supply chain, and optimize cost. Some popular tools of inventory management are as below.

MRP-Materials Requirement Planning

MRP is a computer program used to determine the quantity and type of the inventory item required for production or sourced to support the Master Production Schedule (MPS). It is an essential feeder to the production schedule which provides item information based on the inventory status records, Master Production Schedule, and the bill of materials. It is a computer based process, which helps to meet delivery schedules. By ensuring control over the quantity and timing of the deliveries, it adds efficiency to the production system.

The program helps to reduce delays of lead time and stock-outs as it works on data received on real time of the inventory status, inventory required and master production schedule.

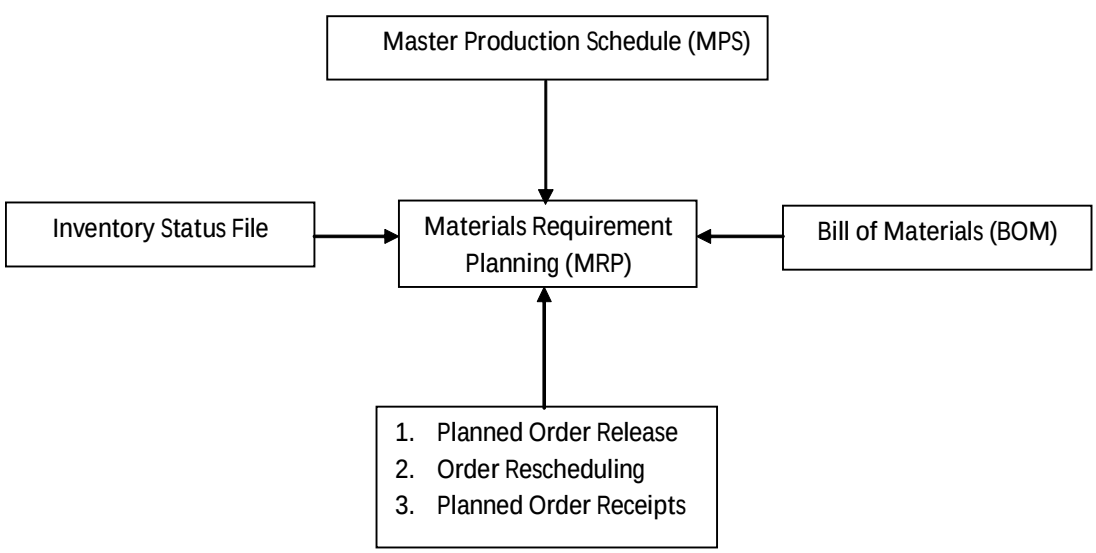


Fig: 11.10.1: MRP

MRP generates reports based on real time requirements and availability. The primary reports generated are:

a) Planned Order Schedule: It is a plan of the quantity per order in each time an order is placed. This schedule is used to source supplies from vendors and to order components and parts from the higher levels within the chain.

b) Changes in Planned Orders: It provides information about changes in order timings, quantities, and even cancellation based on progress of the production process.

Secondary MRP output provides reports as:

a) Performance Reports: It provides indicators of performance of the process including incidents of stock-outs, delivery promises, etc.

b) Exception Reports: It provides reports on errors, scraps produced, delayed production and deliveries, etc.

c) Planning Reports: It serves as an input to planning for the future inventory activities based on the performance reports, and exception reports so generated.

Just-in-Time

The concept of Just-in-time initiated in Toyota Production System by TaiichiOhno has brought far reaching effects into the manufacturing business in the globe. The concept emphasizes the fact that production of components or supplies ought to be made at just the moment at which those are required and not in anticipation of the need. This eliminates safety stock altogether. The concept applies in each of the stage of the supply chain right from sourcing supplies to the delivery of finished goods at the POS. The concept emphasis on reducing inventory costs, which occur due to prolonged waits at various stages. The objective is to attain a highly integrated chain to eliminate wastes of all kinds ranging from process, loading, wrong usage of materials, etc. To ensure zero lead times, components, supplies, and raw materials must reach in the desired form and quantities in the desired time. This requires a philosophy whichnecessitates the following:

a) Uninterrupted flow along the chain

b) Zero inventory

c) Tightly integrated relationship among all stages in the chain

d) Quality as per specifications in all materials and components

The philosophy has enhanced productivity in all the firms that uses it. Reduced waste, elimination of inventory, balanced production and zero defects have been the consequences of its implementation.



CHECK YOUR PROGRESS

Q 6: What is Reorder point?

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Q 7: State three assumptions of the Retailers' EOQ model

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Q 8: State two assumptions of the Production model of EOQ.

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Q 9: What are the primary reports generated by MRP system?

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11.11 LET US SUM UP

After going through the unit we have learnt the following:

- Procurement or Purchasing is a function within a firm which integrates and coordinates with external vendors for supply of materials, components, parts, machinery, etc.
- Inventory decisions in terms of the quantity, variety and the stage of holding have significant impact on the responsiveness of the firm.
- The necessity of a product comes from inventory status of the same. It may be the POS data, the shop floor, or the maintenance section.

- For purchases requiring tender, a Request for Proposal is prepared containing specifications to be met in the supplies and tenders are invited from eligible vendors by intimating in public domain like newspapers, websites, etc.
- In supply chain parlance, inventory refers to all raw materials, semi-finished goods, finished goods which are idle and awaiting sale or processing for value addition in form.Inventory also includes tools, spares, and safety stock maintained to prevent stock outs.
- Inventory handles variations of actual demand against forecasts. It eliminates risks of stock-outs on elongation of replenishment lead times.
- The basic EOQ model is also known as the Retailers' model of EOQ.
- The basic EOQ model is based on constant demand and lead time over the entire period.
- The production model of EOQ is based on the assumption that sales and production occur simultaneously.
- In ABC analysis, the items are classified based on their usage value over a period of time, usually a year.
- The usage value of items when plottedin a curve, a curve called the curve ofmaldistribution is obtained.



11.12 FURTHER READING

1) Lee Krajewski and Larry Ritzman (2011). *Operations Management-Processes and Supply Chains*, Pearson Education, India.
2) D K Agarwal, *Textbook of Logistics & Supply Chain Management* (2007), Macmillan India (P) Ltd., India.
3) S Chopra, P Meindl& D V Kalra (2013). *Supply Chain Management-Strategy, Planning, and Operation*, Pearson Education, India.
4) N D Vohra (2010).*Quantitative Techniques in Management*,McGraw Hill, India.

5) B Mahadevan (2010). *Operations Management: Theory & Practice*, Pearson Education, India.



11.13 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Procurement is the process wherein a firm purchases raw materials, components, semi-finished goods for further processing and/or marketing and distribution.

Ans to Q No 2: hree objectives of procurement and inventory management are as below:

a) Procurement of the desired materials in right quantity, time, and of the right quality

b) Purchase, receive and arrange for flow of materials along the chain

c) To tap market fluctuations and manage inventory to respond to such fluctuations

Ans to Q No 3: Some common types of purchase in a firm are:

a) Spot Purchase

b) Zero Stock Buying

c) Blanket Orders

d) Rate Contract

Ans to Q No 4: Inventory used within a firm can be classified as below:

a) Production Inventory - Raw materials and other components directly used in the production process

b) In-process Inventory- Partially finished goods at different stages of the chain.

c) MRO Inventory- Maintenance, repair and operating supplies that are essential but do not form a part of the manufacturing process. These include lubricants, spares, etc.

d) Finished Inventory -Finished goods at the end of a production process ready for sale

Ans to Q No 5: The constituents of carrying costsare :

a) Costs of holding inventory per unit as a function of time

b) Costs of obsolescence, damage during storage, pilferage, etc.

c) Costs of insurance of the goods held.

d) Cost of capital owing to holdingof the inventory

Ans to Q No 6: The point at which orders are placed is called Reorder Point

Ans to Q No 7: The retailers' EOQ, also known as the basic EOQ model, is based on the following assumptions:

a) The annual demand, carrying cost, and the ordering cost can be determined.

b) The demand is constant over the entire period.

c) The lead time is constant and known.

Ans to Q No 8: The Production model of EOQ is based on following assumptions:

a) Production of items is not continuous but in batches/lots.

b) The annual demand is known and distributed uniformly along the period.

Ans to Q No 9: The primary reports generated by MRP program are:

1. Planned Order Schedule: It is used to source supplies from vendors and to order components and parts from the higher levels within the chain.
2. Changes in Planned Orders: It provides information about changes in order timings, quantities, and even cancellation based on progress of the production process.



11.14 MODEL QUESTIONS

Q 1: What are the steps in procurement? Discuss with a diagram.

Q 2: What are the differences between cycle inventory and decoupling

inventory? What are their respective uses?

Q 3: On what basis are the EOQ models formulated?

Q 4: Describe the relationship between carrying cost and ordering cost with a diagram.

Q 5: Discuss the importance of production model of EOQ. Where is the model used?

Q 6: State the importance of ABC and VED analyses of inventory control in a firm.

Q 7: What are theadvantages of implementation of J-I-T philosophy?

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UNIT 12: MARKETING AND LOGISTICS INTERFACE

UNIT STRUCTURE

12.1 Learning Objectives

12.2 Introduction

12.3 Customer Service

12.4 Costs trade offs in Service Offerings

12.5 Service-driven Logistic System

12.6 Supply Chain Performance

- 12.6.1 Supply Chain Performance Measure: SCOR model
- 12.6.2 Balanced Scorecard (BSC)

12.7 Let Us Sum Up

12.8 Answers to Check Your Progress

12.9 Further Reading

12.10 Model Questions

12.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the basics of Customer Service and Value
- explain the tradeoffs in service offerings
- describe the influence of customer service in a supply chain
- explain supply chain performance
- learn the basics of SCOR model and Balanced Scorecard.

12.2 INTRODUCTION

In this unit we are going to discuss about marketing and logistics interface. Logistics and marketing are complementary business operations that enable a company to ensure that it can offer the right products to the right customers in the right place. In this unit we will discuss briefly Customer Service, Costs trade off sin Service offerings, Service-driven Logistic System and Supply Chain Performance.

12.3 CUSTOMER SERVICE

The present day market is replete with multiple varieties of products of each kind. Irrespective of the different types of consumer products, like, shopping or convenience, specialty or unsought type, each type has multiple numbers of substitutes enabling easy switching of brands in each category. The differences that a firm can make by which it can pull customers lie no longer in the physical product but in the offerings provided by the firm with the product.The offerings differentiate the firm from each other in the eyes of customers. In the premise of availability of variety of options to switch to, customers are in search of a plenty of service offerings in each product category. In case of FMCG products, buyers are lured by variety of compositions, pack sizes, availability, etc. In such products firms ought to be proactive in sensing out customer preferences in initiating newer options in the market. Firms need to stay ahead of others by practice steps in relentless customer innovations as in case of mosquito repellents, soap based germ killers, etc. Mosquito repellents have traversed a long journey from flit spray to coils to electronic machines using tablets. Later the tablets which required replacement every day were replaced with machines that use liquid for as long as month. This soon was taken over by fabric roll-ons and repellant fast burning cards. The transition has progressed parallel to the changing customer requirements innovating over the previous one. Similar innovative moves are observed across product categories and have successfully influenced customers to be attracted to innovations in product offerings. At this point it would be essential to mention that the customers' perception of the total offerings from a firm is referred to as customer value. In assessing value, customers look into several aspects received as tangibles and intangibles from the firm, some of which are Conformity to requirements, Price, and value for money, Product selection, and Variety, Value-added service and Brand. Customers look for more offerings at competitive prices. Firms need to offer the most at lowest prices than competitors through a supply chain that ensures uninterrupted replenishment of products on the shelf, up to date product varieties, and easy replacements

in products wherever required. Keeping prices low can be achieved through the coordinated efforts of the players in the supply chain through accurate demand forecasts, translation of customer orders into deliveries as promised, predicting changes of demand patterns, handling volume in varieties, handling possibilities of obsolescence and fads, etc.

12.4 COSTS TRADE OFFS IN SERVICE OFFERINGS

The bundle of services that a firm offers with the product comes with an associated cost. In any market, there are available products with varied service offerings and priced proportionately to the offerings. The cost a customer is to pay is the resultant of the price of the product, the service offerings associated with the product the firm offers alongside. The cost incurred by the firm in delivering a set of services is a function of its supply chain strategy. An instance where a firm provides a higher set of services raises the cost of the offering. Sustenance in a market is determined by an efficient supply chain that provides services better than competitors at lower prices. The ability of a supply chain in building innovative products, handling variety, meeting short lead times, etc. adds to its costs and pertains to its responsiveness. The relation is best explained by efficiency frontier. The curve is a plot of the costs associated against a given service level. Generally for a product devoid of service level, the cost pertains to the cost of the bare product. However this is a rare and almost redundant observation in the market.

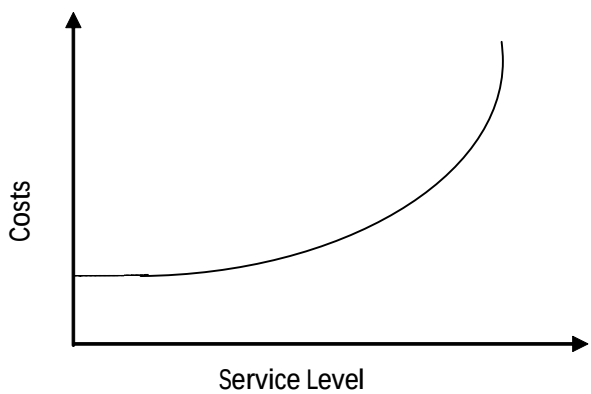


Fig: 12.4: Efficiency Frontier

Firms offer different levels of service at different prices to the market clearly demarcating each offering from the other. Restaurants sometimes have a fast-food outlet at the entrance with limited variety and option of take-away meals with no seating arrangement. Such items are priced low. On the other hand, the restaurant inside has a cozy ambience with a variety in the menu and items priced higher than the take-away arrangement. However, the possibilities of raising the service level at reduced cost have been achieved by various strategies of the supply chain including supply chain restructuring detailed in later units.



CHECK YOUR PROGRESS

Q 1: Define Customer Value.

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Q 2: What are the different types of consumer products?

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Q 3: What is the importance of Efficiency Frontier in supply chain?

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12.5 SERVICE-DRIVEN LOGISTIC SYSTEM

Customer service in a supply chain consists of four components:

a) Order-delivery time

b) Responsiveness

c) Reliability

d) Variety

a) Order-delivery time pertains to the lead time between an order being placed and the order being fulfilled. As a customer places the order, the time for the same to be delivered is normally determined by the type of the product. For convenience products, with availability of easy substitutes the time at the customers level is zero; yet the same for

specialty products can be relatively long. The cost of the product, the nature of the product, the customization sought, all influence the lead time a customer is willing to agree upon for the delivery. The lead time for the supply chain is the sum total of the times in production, assembling, distribution and retailing levels. Till the order is received, the supply chain has to move with inventories based on forecasts. Beyond the receipt of the order the chain works with actual data and cases of uncertainties, obsolescence, and loss of sales are absent. This explains why the customer ordering level in the chain streamlines the process. The level at which the customer places the order is the point at which the demand data in the form of customer order enters the chain and aligns the stages that follow as per the demand received. The sooner the order is received, the better it is since this enables the chain to work with actual data and not on forecasts.

A furniture store that makes wooden furniture works with inventory of wood andplyboards. Upon receipt of orders the store makes-to-order the furniture as per specifications of the customer. In such a chain the customer order point is at the production stage. The design of product being purely as per specifications, the customer is generally ready to have a longer lead time.

Fast food centres work in configure-to-order model with a limited variety in the menu. The basic ingredients are prepared in advance. Upon the order of the customer, the quantity and type of ingredients are varied to fulfill the order. The customer in such a centre enters the chain at the stage where the assembling of the ingredients is determined and is later than the make-to-order one.

Products of shopping type operate on forecasts in the supply chain. Such products being of low value and high variety availability are easily substitutable and require availability on the shelves. Such products are made to stock on the retailers.

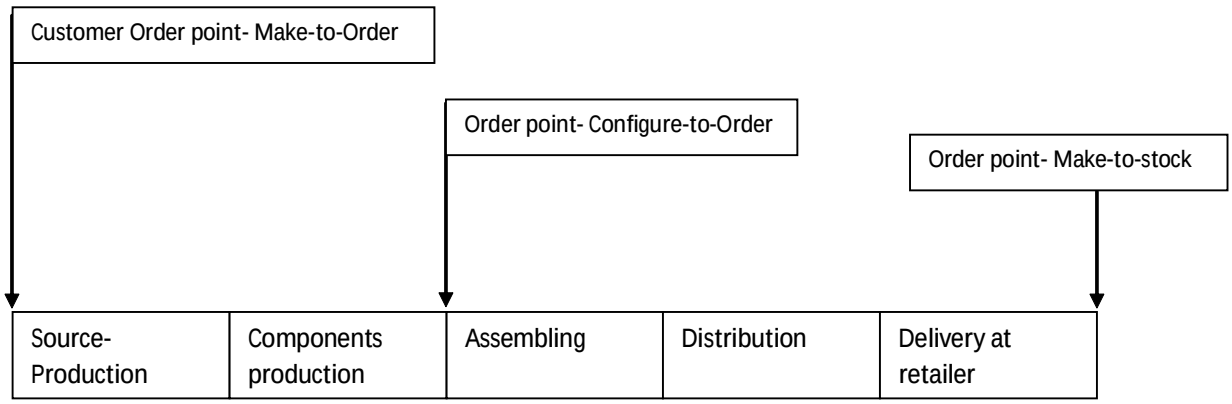


Fig:12.5 (a): Order points in different Supply Chains

b) Responsiveness of a supply chain is its ability to meet market demands of variety and volume. The level of responsiveness is associated with the nature of the product. A high level of responsiveness is obtained in fulfilling actual demands, based on data obtained through actual customer orders for make-to-order and assemble-to-order and through forecasts data for make-to-stock types. Fulfilling market demands within allowable order delivery time is the objective of any supply chain. In doing so the chain at times faces loss in the form of obsolete products, lost sales, loss of goodwill owing to brand switching caused by unavailability of incorrect forecasts, etc.

c) Reliability refers to availability of products on promised order delivery time. The product type determines the variation in the reliability; for a make-to-stock supply chain it is the availability on the shelf while for assemble-to-order types it is the orders delivered as promised. In either type in ascertaining high reliability in terms of service level of the chain, the chains strike out a tradeoff at a point in the efficiency frontier. For FMCG products, in order to be highly reliable, the chain caries high levels of inventory along the chain yet includes risks of damage in transit, obsolescence, costs of holding inventory, mismatch of forecast with actual sales, etc. For specialty products and shopping type products, the preponing of the customer ordering point in the chain, though is an advantage, yet runs risks of failure to meet promised dates causing loss of goodwill and brand switchover. Since

the size of the sale is normally high in such cases, the loss so incurred is heavy.

d) Variety is a necessity in the present day market. The problem of predicting a sale is further complicated since forecasts are to be done for each variety.As variety rises,this is more prominent in make-to-stock types. As a workable solution to this, standardization of components has been put in practice in the electronics industry to facilitate easy interchangeability among varieties. Sometimes, where it is difficult to match costs and service level with larger varieties, firms do away with some varieties as P&G has done.

12.6 SUPPLY CHAIN PERFORMANCE

Setting priorities of customer service is realized through a high performing supply chain that meets delivery schedules, sticks to volume-variety demands and is flexible to accommodate changes in transit of inventory within a supply chain. A supply chainwhich is robust to variations of customer demands is high in its performance as a chain. Superior supply chain performance has proved to be competitive than its counterparts. A supply chain performance has been best explained by the SCOR model, which is largely applicable across industries to explain the supply chain processes.

12.6.1 Supply Chain Performance Measure: SCOR model

The Supply Chain Operations Reference model better known as the SCOR model was developed by the Supply Chain Council and is centered on five primary management processes of Plan, Source, Make, Deliver, and Return. It was developed as an open industry module and is open for participation from industries for its development. As per the model, supply chain performance measures in an industry fall under the following five categories-

a) Reliability

b) Responsiveness

c) Flexibility

d) Agility and

e) Assets Management Efficiency

Reliability pertains to right product delivery, at the right place in right quantities with right specifications and in the right time.

Responsiveness is the ability of a chain to fulfill orders as per demands.

Flexibility provides the chain with the ability to accommodate changes of the market.

Costs include the costs incurred in the entire chain with the flow of products through it.

Asset management efficiency is the ability of the firm in managing efficiency of resources in fulfilling the above four categories of performance in the chain.

The SCOR model has been instrumental in enabling firms compare their supply chain performance within the industry and outside. The model helps the customers to measure the performance and enables the suppliers' performance. Further to this, it helps in identifying processes which need improvement, identifying wastes, etc. The advantages obtained from measuring supply chain performances help firms in benchmarking studies.

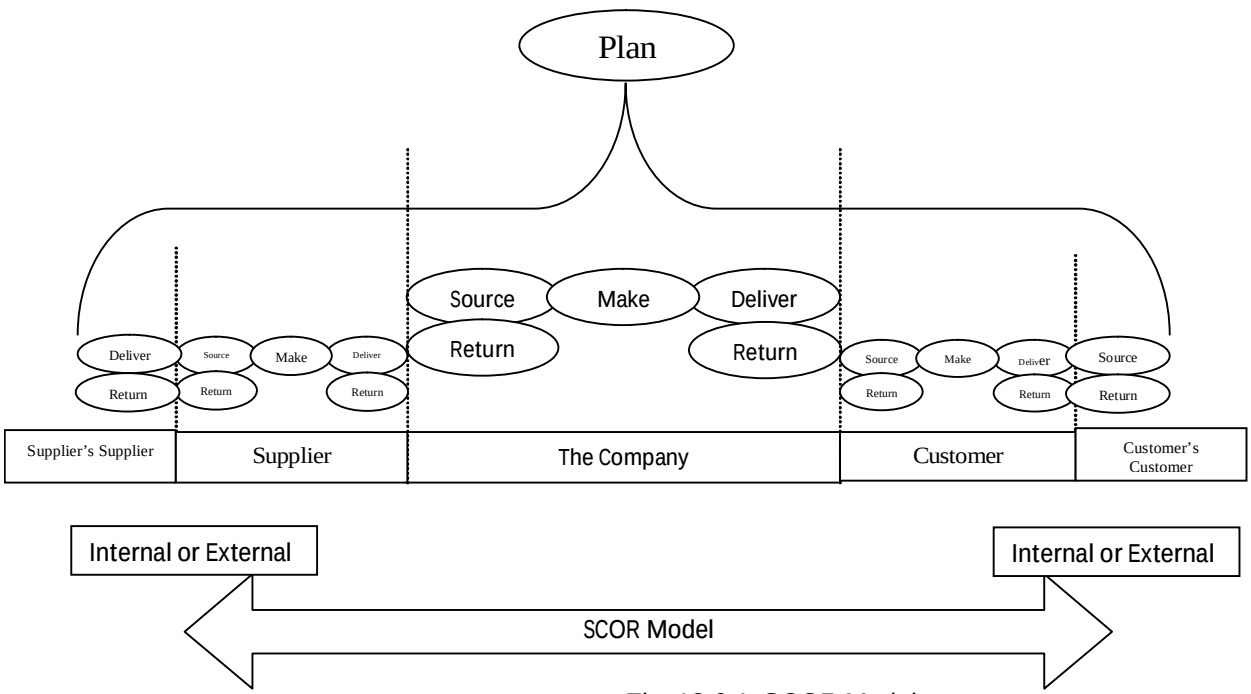


Fig: 12.6.1: SCOR Model

12.6.2 Balanced Scorecard (BSC)

Traditionally the performance of any firm has been assessed through financial measures, even though largely successfulfinancial measures involving analyses of past data are incomplete in helping firms to translate strategies to actionable objectives. Balanced Scorecard (BSC) is a model developed by Kaplan and Norton used originally to measure performance. It helps organizations to translate their vision and mission through actions thereby identifying variations in strategies or realignment of strategies wherever required. It focuses on continuous improvement of its internal business processes to enhance the performance. By facilitating linkage of the actions with the strategies, BSC helps the organization to focus on long term goals and design internal processes accordingly.

The scorecard consists of four quadrants that definethe internal -external and present-future activities of the organization.The method uses sharing of information along the partners in a supply chain, the internal processes within an organization and across business functions to coordinate collectively in successful execution of the organizational goals.

Implementation of BSC involves the following steps.

a) Identification of the vision and mission of the firm.
b) An analysis of the customers' perspective, expectations, responsiveness of the deliveries of the firm through its supply chain.
c) Identification of levels, partners in the supply chain which can ensure responsiveness and cost optimization within the supply chain.
d) Setting up ofindicators that can help to quantify the objectives
e) Translate the objectives into action plans.

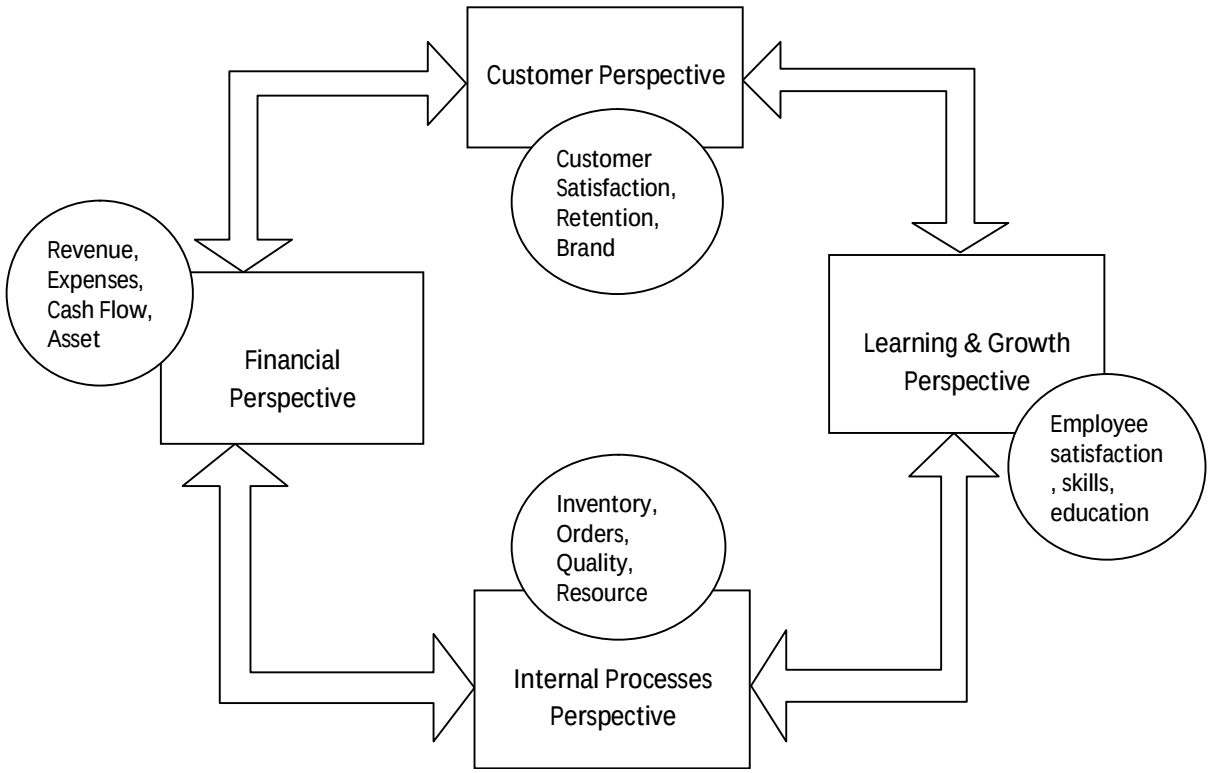


Fig: 12.6.2: Balanced Scorecard

Improving the performance of a supply chain is complementary to the improved business performance of a firm. The improvised performance of a firm reflected in reduced costs, improved profitability, improvised operational efficiency and reduction in working capital are achieved by a combination of some or all of the below listed supply chain exercises.

a) Reduction in inventory at the store level, in-transit, distributor level, and manufacturer levels
b) Preponing of the customer order point to deliver products based on actual demand
c) Reduction of backorders and lost sale
d) Agility in handling market variations
e) Reduced order delivery lead time.



CHECK YOUR PROGRESS

Q 4: What are the locations of customer order points in different supply chains?

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Q 5: What is Reliability of a supply chain?

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Q 6: What are the steps in implementation of Balanced Scorecard?

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12.7 LET US SUM UP

After going through the unit we have learnt the following:

- The offerings differentiate the firms from each other in the eyes of customers.
- Customers look for more offerings at competitive prices.
- The bundle of services that a firm offers with the product comes with an associated cost.
- The cost incurred by the firm in delivering a set of services is a function of its supply chain strategy.
- Customer service in a supply chain consists of four components: Order-delivery time, Responsiveness, Reliability, Variety
- Order-delivery time pertains to the lead time between an order being placed and the order being fulfilled.
- Responsiveness of a supply chain is its ability to meet market demands of variety and volume.
- Reliability refers to availability of products on promised order delivery time.

- Supply Chain Council is centered on five primary management processes of Plan, Source, Make, Deliver, and Return.
- Balanced Scorecard helps organizations to translate their vision and mission through actions thereby identifying variations in strategies or realignment of strategies wherever required.



12.8 FURTHER READING

1) David Levi, Philip Kaminsky& Ravi Shankar (2008). *Designing & Managing the Supply Chain- Concepts, strategies and Case Studies*, Tata McGraw Hill, India.
2) N Rangaraj, G Raghuram& M MSrinivasan (2009), *Supply Chain Management for Competitive Advantage-Concepts and Cases,* Tata McGraw Hill, India.
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12.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The customers' perception of the total offerings from a firm is referred to as customer value. Value comes of several aspects received as tangibles and intangibles from the firm such as Conformity to requirements, Price, and value for money, Product selection, and

Variety, Value-added service and Brand.

Ans to Q No 2: Consumer products types of shopping or convenience, specialty or unsought type.

Ans to Q No 3: Efficiency Frontier is a plot of the costs incurred in a supply chain against a given service level. The ability of a supply chain in building innovative products, handling variety, meeting short lead times, etc. adds to its costs.

Ans to Q No 4: The points of entry of a customer in different supply chains are as below:

a) Make-to-stock type chain –At the retailer's end.

b) Configure-to-order type chain – At a point prior to assembling the product.

c) Make-to-order type chain- At a point in the source of production in the chain.

Ans to Q No 5: Reliability pertains to right product delivery, at the right place in right quantities with right specifications and in the right time.

Ans to Q No 6: Implementation of BSC involves the following steps.

a) Identification of the vision and mission of the firm.

b) An analysis of the customers perspective, expectations, responsiveness of the deliveries of the firm through its supply chain.

c) Identification of levels, partners in the supply chain which can ensure responsiveness and cost optimization within the supply chain.

d) Setting upof indicators that can help to quantify the objectives

e) Translate the objectives into action plans.



12.10 MODEL QUESTIONS

Q 1: Explain the importance of efficiency frontier for supply chain strategies of a firm.

Q 2: What are the components of customer service in supply chain? How does order delivery lead time impact inventory costs within a chain?

Q 3: Explain the impact of customer order point in different supply chains. How does order point influence customer value?

Q 4: How have supply chains been designed to handle variety of products in markets?

Q 5: Discuss the role of agility in supply chain performance.

Q 6: What are the different categories of supply chain performance measures in the SCOR model?

Q 7: Discuss why financial measures are not a complete measure of the performance of a firm. What other measures as per Balanced Scorecard are necessary to gauge the performance?

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UNIT 13: SUPPLY CHAIN BENCHMARKING

UNIT STRUCTURE

13.1 Learning Objectives

13.2 Introduction

13.3 Understanding the Benchmarking Concept

13.4 Benchmarking Process

13.5 Success Stories

13.6 Let Us Sum Up

13.7 Further Reading

13.8 Answers to Check Your Progress

13.9 Model Questions

13.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the concept of benchmarking and its importance in supply chain
- learn the various guidelines to be followed for initiating benchmarking exercise
- learn the different benefits and limitations of benchmarking.
- understand the different types benchmarking
- describe the different steps for implementation of benchmarking
- learn about initiation of benchmarking in Xerox.

13.2 INTRODUCTION

Benchmarking is a continuous process of evaluation and learning of the best in class business practices. The process focusses on identification of the best performers in the industry, to evaluate those business processes to learn and integrate the practices to enhance the performance of the firm. Learning the factors contributing to enhanced performance of the best firms, to adopt those practices, and improvise to a raised level of performance is the heart of benchmarking.

Benchmarkingis a continuous learning exercise not restricted to learning from firms within the industry but also from firms of allied or non-allied industries. Learning of thebest practices is not limited to competing firms but to non-related non-competing firms as well.

The concept of benchmarking was initiated at Xerox Corp. in 1979 through reverse engineering of the rivals' products in the market. The concept was developed with a view to eliminating wastes, reducing cost, and raise quality of products. Present day benchmarking is based on thirty year old exercises at Xerox.

Guidelines for Benchmarking

In the exercise of benchmarking, it is essential that firms first learn their status of business in totality, the critical success factors, etc. The following can be a guideline for initiation of benchmarking exercise for a firm.

a) The business at focus: The firm must be aware of the strengths and weaknesses of the practices being followed in it, the results of performance based on its current practices, the detailed processes, and activities. This requires that the operations of the firm are documented in details.

b) Identification of the best-in-class performers: There is plenty to be learnt from the best performers, their policies, operations, strengths, etc. It is however not restricted to those within the industry. Some practices from non-related industries may also serve as learning lessons.

c) Learning and Inculcation: The firms need to learn the lessons behind the best performers and inculcate those through internal modifications wherever required for inculcation.

Benefits of Benchmarking

a) Increase Productivity and plan for long term profitability

b) Helps the firm to study its current practices to identify practices requiring improvement

c) Helps to explore directions in which competitors are growing and hence helps to keep pace with the changes in the market industry or

the larger market scenario

d) Continuous learning exercise to reengineer existing practices

e) Helps to assess strengths and weaknesses and to learn from their weaknesses to explore new areas of improvement

f) Helps to improvise performance through innovative practices and realign goal in the direction of growth triggered by market changes

13.3 UNDERSTANDING THE BENCHMARKING CONCEPT

Best practices are no longer limited to the type and characteristics of a firm or industry. The same can be adapted and replicated in any firm of any industry. Hence best practices can be benchmarks irrespective of the type and nature of business. However, some practices do remain specific to industries.

Based on the parameters of comparison for assessment of current practices, benchmarking could be classified into three types:

a) Performance Benchmarking: It refers to benchmarking the performance with any other firm in terms of the overall performance.

b) Process Benchmarking: It relates to benchmarking measures which can indicate the performance of a firm in terms of customer satisfaction, sales volume, assets, etc.

c) Strategic Benchmarking: It relates to benchmarking the long term activities by other firms in line with the objectives set and the strategies followed for achieving those.

Based on the performers' type and category, benchmarking can be classified into four categories:

a) Internal Benchmarking: InternalBenchmarking is an intra-firm benchmarking exercise where the comparison is done amongst/ between the best performing departments of the firm.

b) Competitive Benchmarking: Competitive Benchmarking is the intra-industry benchmarking against the similar firms within the industry putting up the best of performance.

c) Functional Benchmarking: Functional Benchmarking is the exercise

of comparison conducted across similar firms but non-competitive in nature to benchmark the best functions and processes.

d) **Generic Benchmarking:** Generic Benchmarking is conducted across business irrespective of the nature, class, or type of business. It is not limited to the industry or geography of the firm.

Limitations of Benchmarking

a) Learning in details about the best performing firms, the policies, and implementation details is not an easy task. More complicated is the process of adapting the same.

b) Benchmarking to be successful should be a continuous process. It cannot be conducted occasionally.

c) Financial details are generally easy to access; hence benchmarking exercises normally remain restricted to the assessment of financial performance indicators.

d) It is easy to identify the best performers and the practices yet implementing those through changes in policies, structures, etc. in a firm may be extremely difficult, especially because that might require strategic level modifications.



CHECK YOUR PROGRESS

Q 1: Define Benchmarking.

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Q 2: State three benefits of benchmarking.

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Q 3: What are the types of benchmarking based on the parameters of practices?

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Q 4: What is generic benchmarking?

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Q 5: State two limitations of benchmarking.

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13.4 BENCHMARKING PROCESS

The fundamental premise on which benchmarking can be conducted in a firm is a through learning of the firm's current practices, its alignment of objectives and strategies with the vision and mission statement. Knowing the organisation first can help to first focus on its strengths and weaknesses to strengthen and improvise further. The process consists of five steps as detailed below.

a) **Planning:** Planning is the first phase in benchmarking. The firm chalks out the process or product or the practice for benchmarking and identifies the industry or the firm with which it is to be performed. The firm forms a benchmarking team for smooth conduct of the exercise. The firm explores sources of data which can serve as feeder to the exercise.

b) **Analysis:** An analysis is required to assess the gap that exists between the firm and the benchmark chosen. A learning of the internal business process of the benchmark needs to be conducted for the same.



Fig: 13.4: Benchmarking Process

c) **Integration:** Learning the best business practices should follow measures for adaptation of the same in the firm and in its practices.

The best practices so learnt need to be communicated to the employers for adaptation. This requires extensive sessions with the employees to explore mechanisms for smooth adaptation.

d) **Action:** Learning succeeds action of implementation of the practices in the firm. A detailed action plan is set with specific actions, measurements, and progress that would follow.

e) **Maturity:** The successful implementation of the benchmark processes and complete institutionalization with the existing processes complete the process. A continuous improvement plan is to be in place to ensure updating of the practices adapted. It now opens up other avenues of processes for benchmark.

13.5 SUCCESS STORIES

Xerox Corp.

Xerox had been making phenomenal profit and growth in business of copiers till 1970. 1970 brought in stiff competition for Xerox from Japanese firms. In view of the competition faced, Xerox launched a copier model 3300 which eventually suffered losses owing to poor quality and the same had to be recalled from the market. Xerox redeveloped the same and relaunched it after a period of one year but with little success. Profits were falling and products performed inferior in the market. Time demanded that Xerox either performs or perishes in the hands of Japanese products. Xerox realized that it is high time to explore the business practices of Japanese firms. Xerox officials visited Japan to understand the practices. It was observed that Japanese products were rarely defective. Xerox products wererated 95 % in terms of quality while those of Japanese wererated 99.5 %. Japanese firms carried inventory one sixth of Xerox and the overheads at Xerox were double in figures.

The visit proved to be a turning point in Xerox. It taught Xerox the lesson that it needs to redesign its business process if it were to survive. Otherwise, it would soon be eroded by the Japanese competitive firms. Xerox initiated a learning exercise from the best performers in the market to achieve superiority in quality of products, costs, logistics, etc. Xerox

began by identifying the best performers in specific areas of process and by learning the mechanisms followed by the benchmarks in standing out in performance amongst the rest. Consequent to this, Xerox visited best practicing firms including LL Bean, John Deere, etc.

Dabbawalas of Mumbai

The Mumbai Tiffin Box Suppliers Association is a 120 year old door to door service provider of lunch in Mumbai. The association has over 4000 employees, who are semi-literate but have achieved a six sigma performance level in logistics management. The association has been a benchmark in urban logistics with a zero investment based system and absence of technology in the process.

The dabbawalas use the public transport system of local trains combined with hand carts for point to point transfers. A colour coded pattern on the lunch boxes is followed for ease of identification and sorting. With no warehouses in the route, crossdocking is practiced for sorting at intermediate points in the route.



CHECK YOUR PROGRESS

Q 6: State the five steps in benchmarking process.

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Q 7: What did the Xeroxofficials realize about their performance upon their visit to Japan?

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Q 8: State two business characteristics of Mumbai Dabbbawalas.

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13.6 LET US SUM UP

After going through the unit we have learnt the following:

- Benchmarking isa continuous learning exercise not restricted to learning from firms within the industry but also from firms of allied or non-allied industries.
- Some practices from non-related industries may also serve as learning lessons.
- Benchmarking helps firms to learn from their weaknesses to explore new areas of improvement.
- Based on the performers' type and category, benchmarking can be classified as Internal Benchmarking, Competitive Benchmarking, Functional Benchmarking, and Generic Benchmarking.
- It is easy to identify the best performers and the practices, yet implementing those through changes in policies, structures, etc. requires strategic level modifications.
- During planning for benchmarking, the firm forms a benchmarking team for smooth conduct of the exercise.
- Xerox in 1979 began benchmarking by identifying the best performers in specific areas of process and thereby learnt the mechanisms followed in standing out in performance.
- Mumbai Tiffin Box Suppliers Association is a door to door service provider of lunch and has been a benchmark in urban logistics with a zero investment based system and absence of technology.



13.7 FURTHER READING

1) Azhar Kazmi (2009). *Strategic Management & Business Policy*, McGraw Hill, India.

2) D K Agarwal, *Textbook of Logistics & Supply Chain Management* (2007), Macmillan India (P) Ltd., India.

3) S Chopra, P Meindl& D V Kalra (2013). *Supply Chain Management-Strategy, Planning, and Operation*, Pearson Education, India.

4) B Mahadevan(2010). *Operations Management: Theory & Practice*, Pearson Education, India.

13.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Benchmarking is the process that identifies the best performers in the industry to evaluate those business processes to learn and integrate the practices to enhance the performance of the firm.

Ans to Q No 2: Three benefits of benchmarking are:

a) It helps to increase productivity and long term profitability.

b) It helps to keep pace with the changes in the market industry or the larger market scenario.

c) It helps the firm to study its current practices to identify practices requiring improvement.

Ans to Q No 3: The types of benchmarking based on the parameters of practices are:

a) Performance Benchmarking: It refers to benchmarking the performance with any other firm in terms of the overall performance.

b) Process Benchmarking: It relates to benchmarking measures which can indicate the performance of a firm in terms of customer satisfaction, sales volume, assets, etc.

c) Strategic Benchmarking: It relates to benchmarking the long term activities by other firms in line with the objectives set and the strategies followed for achieving those.

Ans to Q No 4: Generic Benchmarking is conducted across business irrespective of the nature, class, or type of business. It is not limited to the industry or geography of the firm.

Ans to Q No 5: Two limitations of benchmarking are:

a) Benchmarking should be a continuous process and not an occasional one.

b) Benchmarking exercises normally remain restricted to the assessment of financial performance indicators.

Ans to Q No 6: The five steps in benchmarking process are:

a) Planning

b) Analysis

c) Integration

d) Action and

e) Maturity

Ans to Q No 7: The officials at Xerox observed the following in their business upon visit to Japan:

a) Products of Xerox wererated 95 % in terms of quality while those of Japanese wererated 99.5 %.

b) Japanese firms carried inventory one sixth of Xerox.

c) The overheads at Xerox were double in figures.

Ans to Q No 8: Two business characteristics peculiar to Dabbawalas are:

a) Use of public transport system of local trains combined with hand carts for point to point transfers.

b) A colour coded pattern on the lunch boxes is followed for ease of identification and sorting.



13.9 MODEL QUESTIONS

Q 1: Discuss theessential guidelines prior to initiation of benchmarking in a firm.

Q 2: How does benchmarking influence the productivity of a firm? Discuss.

Q 3: Classify benchmarking based on parameters of performance and

category of performers.

Q 4: How does competitive benchmarking differ from functional benchmarking?

Q 5: Describe the stage of 'Integration' in a benchmarking process.

Q 6: State three factors essential for successful implementation of benchmarking exercise.

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UNIT 14: RECENT TRENDS IN SUPPLY CHAIN MANAGEMENT

UNIT STRUCTURE

14.1 Learning Objectives

14.2 Introduction

14.3 New Developments in Supply Chain Management

- 14.3.1 Lean Manufacturing
- 14.3.2 Just-in-Time
- 14.3.3 Orchestration

14.4 Supply Chain Outsourcing

14.5 Co-makership

14.6 The Role of E Commerce in Supply Chain Management

14.7 Green Supply Chain Management

14.8 Distribution Resource Planning

14.9 World Class Supply Chain Management

14.10 Let Us Sum Up

14.11 Further Reading

14.12 Answers to Check Your Progress

14.13 Model Questions

14.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- learn about the various developmental processes in supply chain management
- learn the importance of lean manufacturing, JIT and orchestration in supply chain
- understand the role of co-makership and the impact of ERP in supply chain
- describe the difference between traditional supply chain and green supply chain
- learn about need and importance of distributed resource planning

14.2 INTRODUCTION

The supply chain practices are the determinants of profitability, efficiency, and growth for any business. Cost efficiency is a consequence of an efficient supply chain. The integration of the stages within a supply chain connects the preceeding and the succeeding stages, thereby enabling flow of information and inventory along the chain on real time basis. This has become possible by virtue of some enablers including information technology, strategic business practices like JIT, lean manufacturing, etc. Earlier, the stages worked in isolation of one another giving enough space to each stage to apply its own business practices in isolation. Customer forecasts data were rarely percolated along the chain leading the stages to apply their own estimates based on requirements of the preceeding stages to design and develop its business plan, which in many a case did not have any convergence to the actual customer demands at the markets. The disintegrated pattern of operation of the stages added to the lead time, irregular demand fulfillment patterns, and loss of sale besides adding to the cost in the chain.

The percolation of inventory data across the chain has enabled maintenance of zero inventory levels thereby reducing costs at all stages.Besides, the dependence on information technology, the use of a number of practices including optimization models, big data analysis, etc. have responsiveness and efficiency in the supply chain.

14.3 NEW DEVELOPMENTS IN SUPPLY CHAIN MANAGEMENT

Supply Chain practices are constantly growing in terms of business efficiency and customer service.Benchmarking has triggered the need for continuously upgrading supply chain practices. In addition, the competitiveness in the market place and the ever changing customer buying patterns have left the firms on their toes for relentless attempts of improvising on customer service. As a part of the pressure for better performance or by its own urge for improved performance, firms have

resorted to a number of business practices like lean manufacturing, orchestration, big data analyses, collaboration, etc.

14.3.1 Lean Manufacturing

Lean manufacturing is not a new concept. It was implemented in Toyota Production System (TPS). But the transition of firms into it has been gradual. The process emphasises on reduction of waste in the production. In doing so it focuses on seven types of wastes in manufacturing including wastes of inventory and in transportation. Lean manufacturing implies reduced wastes through continuous improvement better known as *kaizen*[1] as in TPS. Unlike a push system, lean manufacturing is a pull system where manufacturing is initiated through customer demands. As the chain is made visible along all stages, every customer demand initiates the necessary activities of sourcing, assembling, shipping in line with the requisite delivery dates at the customer level. On the contrary, the traditional push systems forward inventory in anticipation of demand thereby creating inventory at different levels in the chain. To synchronize demand and supply, a carefully planned coordination with the vendors is arranged through the usage of JIT. Lenovo uses a combination of its in-house products and those of its partners through its direct shipping policy. The direct shipping policy from its outsourced partners reduces the in- transit inventory. Lenovo has successfully maintained its relations with the outsourced partners through policies which enable them to have visibility to the list of approved vendors but not on the pricing agreements. It has minimized manual interventions in its ordering process. It uses the policy of sell on water which enables Lenovo to allocate in transit products to customers. A tight integration facilitates usage of JIT for zero inventory levels and attainment of agility, responsiveness, and reduced wastes at the supply chain.

14.3.2 Just -in -Time (JIT)

The concept of Just -in -Time (JIT) was proposed and implemented by a shop manager TaichiOhno in Toyota Motor Company. The philosophy uses manufacturing and availability of required units at required quantities and at required time without any holding of inventory at any stage in the entire production process. Processes are performed just at the time required nowhere ahead of time and nowhere beyond time. The implementation of the philosophy demands undisturbed flow of resources, quality supplies and equipments, minimal set up costs and set up time and cordial vendor relationship. Delays due to machine breakdowns, low quality products due to poor quality supplies, etc. are not affordable since such disruptions disrupt the entire flow of the process.

JIT emphasises on reduced wastes through the usage of multi- functional workers and general purpose machines which enable the workers to have a standard operating schedule for the machinery and as such variety in products can be handled with minimal set up costs and time. JIT philosophy cannot afford to lose time and resources due to machine breakdowns which causes missed deliveries. It therefore requires an intensive quality maintenance programme called Total Productive Maintenance (TPM). TPM is more than preventive maintenance. It is a companywide policy that practices programmes for obtaining zero defects towards continuous improvement strategies. The relationship with suppliers is critical. Hence firms implementing JIT design its suppliers' relations in such a way that the vendor firms add to achieving the goal of JIT. Firms have implemented JIT in their versions as in case of HP as MAN(Material as need) and at IBMas ZIPS (Zero inventory production system)

14.3.3 Orchestration

Orchestration combines people, process, technology, and policies to obtain efficiency of operations and toprovide satisfactory customer service. For achieving this, end-to-end visibility is essential since it has to integrate outside vendors and logistics partners.

Orchestration involves interfunctional as well as interorganisational components.Interfunctional orchestration is the integration of the functions within an organisation viz., marketing, distribution, manufacturing, etc. Whileinterorganisational components orchestrate the firms and vendors associated with the flow within the chain. Orchestration shares information across the partners to derive benefits of visibility of flow, optimize logistics and to facilitate reverse logistics to the best possible.

14.4 SUPPLY CHAIN OUTSOURCING

Like any outsourcing process, supply chain operations are popularly outsourced to third party professionals. The primary purpose of it is to enable the firm to focus on functions of core expertise leaving the rest to experts in the industry.

Outsourcing of supply chain practices has been generally taken for granted to be outsourcing of logistics functions. However various other supply chain activities can be outsourced. Lenovo outsources products manufactured at vendors' ends and arranges for direct shipment to customers many a time. Gone are the days when entire manufacturing operations right from sourcing of raw materials till selling were performed by a single firm, as was done by Ford. Sourcing of materials and manufacturing are at times outsourced from other firms. Tata outsources the engines of passenger cars in India from Fiat.

Original equipment manufacturers (OEM) now produce parts and components and sell to many firms or to specific firms, as per agreements, who further assemble and market assembled products with their brand names. The supplies or components sold to the firms areknown as Value

added Reseller(VAR). This relieves the VAR of concentrating in manufacturing of all the components that go into a product. Hence the VAR can focus on design, marketing, etc. of the final product. The OEM-VAR combination is widely popular in the automobile manufacturers and in the PC manufacturers. Dell, the VAR, uses the Windows software produced by Microsoft (OEM).

There is yet another perspective to defining OEMs. Unlike the assembler firm being named as VAR, sometimes they are referred to as OEM, meaning the firm manufacturing the product and not an aftermarket (or counterfeit) product.

Outsourcing provides the firm with the flexibility of picking and choosing the vendors it wants to work with. Warehousing is another operation generally outsourced in supply chain operations.



CHECK YOUR PROGRESS

Q 1: State two essentials for lean manufacturing.

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Q 2: Where did JIT initiate? What is the philosophy behind it?

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Q 3: What is TPM?

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Q 4: What is Orchestration?

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Q 5: What are the full forms of OEM and VAR?

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14.5 CO-MAKERSHIP

Co-makership is the policy of working with a limited number of

vendors but on a long term relationship based on mutual trust and confidence. The suppliers are more an extension of the firm rather than vendors. The firms work together to share product or process innovations and business development strategies. The advantage is evidently to work with fewer numbers of players with ease of coordination and control. The supplier firms are mere extensions of the firm since the policies, requirements are specific to the firms. Since the firms work together for common goals, they can cut down on costs, attain competitive advantage. The close coordination enables to achieve higher levels of quality in product and process and provides best customer service. It reduces the cycle and raises the inventory turnover ratio.

The process is not without demerits. The firms sharing sensitive information and costs can reduce the bargaining power and open up scope for losing confidentiality of internal business operations. The transactioncost in the form of cost of negotiation, implementation, and costs of contract execution is high. The greatest hurdle however is to bring the vendors to an agreement in the operating processof the business.

Co-makership is used in Nissan Motors in UK where a team of experts from Nissan work with the suppliers to guide them to align their operations as per the requirements of Nissan.The objective of experts is to enable the firms to reduce their cost of operation and achieve efficiency in the firms' business operations.Mahindra& Mahindra in India has been practicing co-makership by virtue of which it has reduced its supplier to one-fifth in numbers.

14.6 E-COMMERCE IN SUPPLY CHAIN MANAGEMENT

Electronic Commerce is popularly known as E Commerce. E commerce is commerce over the electronic mode. It requires doing business over the internet. Activities like purchasing, order tracking are now performed over the electronic mode. As such, there are different businesses viz., B2C (Business to Consumer), B2B (Business to Business) and C2C (Consumer to Consumer). B2C model integrates a business firm with a consumer. A consumer gets access to the business of a firm through its

web portal. The information of the products of the firm are available in the website by going through which the customer can place an order and make payments. This initiates supply chain activities at the firms' end to enable assembly or procurement of supplies for assembly, transportation, distribution, and delivery of the products to the customers.This business reduces risks of uncertainty of demand based on forecasts. Amazon, Flipkart are B2C businesses.

The other type is the B2B business where a firm does business with another firm, which may be any vendor like a supplier, a logistics partner, and distributor. Such a business even enables auctions over the internet. It is an interfirm business but on a virtual platform establishing a virtual supply chain. The process is inexpensive and easy to transact as a business. E commerce firms like amazon conducts B2B business to transact with other firms to facilitate delivery of products to customers.

The third type of Ecommerce business is the C2C business where customers can interact and transact with other buyer and not firms. Sites such as quikr.com, olx.com are some examples which facilitate the interaction of a buyer and a seller without the intervention of any firm or similar institution. Some sites such as ebay even facilitates auction of products. The ecommerce site facilitates only the platform for interface between the two parties; rest is mutually decided by the buyer and the seller.

E commerce requires internet over a PC network. Gaining popularity over this is the m-commerce, which facilitates transactions over small devices like mobile phones. E commerce firms have now developed applications which can be installed in the mobile phone to facilitate business through the mobile phone.The convenience of doing a business at fingertips has facilitated in exponential growth of m-commerce and is likely to surpass e-commerce in a near future. The biggest boost in m-commerce is provided by the ease of banking operations including payments, transfers, etc. through mobile based applications.

E-commerce has preponed the customer entry point in a supply chain, hence reducing dependence on forecast and enabled progress of

supply chain activities through real time customer orders. This helps all the partners in the chain to have access to order processing status of the orders. The visibility helps to track transporters through GPS trackers to help the distributors and retailers to act accordingly of actual in-transit delays (if any). E-commerce has changed the retail industry in the world; the brick and mortar shops are transformed into virtual shops, with multitudes of facilities to give the customers the best shopping experience no less than a real visit to a store for purchase. Some e-commerce sites provide options of trial of garments at home to choose prior to purchase such as bluestone while others like lenskart requires a photograph of the customer to be uploaded to view himself /herself with different frames prior to placing orders. The greatest option through online purchases is the facility of customizing products as per needs. Such facilities have successfully enabled firms to design a strong push-pull supply chain within absolute elimination of costs of obsolescence, and inventory.

14.7 GREEN SUPPLY CHAIN MANAGEMENT

A Green Supply Chain is one in which all the supply chain activities including sourcing, manufacturing, logistics, distribution, and reverse logistics are conducted in anenvironmentally sensitive way minimizing waste at all stages. A green chain minimizes risks to the environment, crafts a sustainable chain which adheres to environmental regulations and focuses on reuse and recycle of the products.

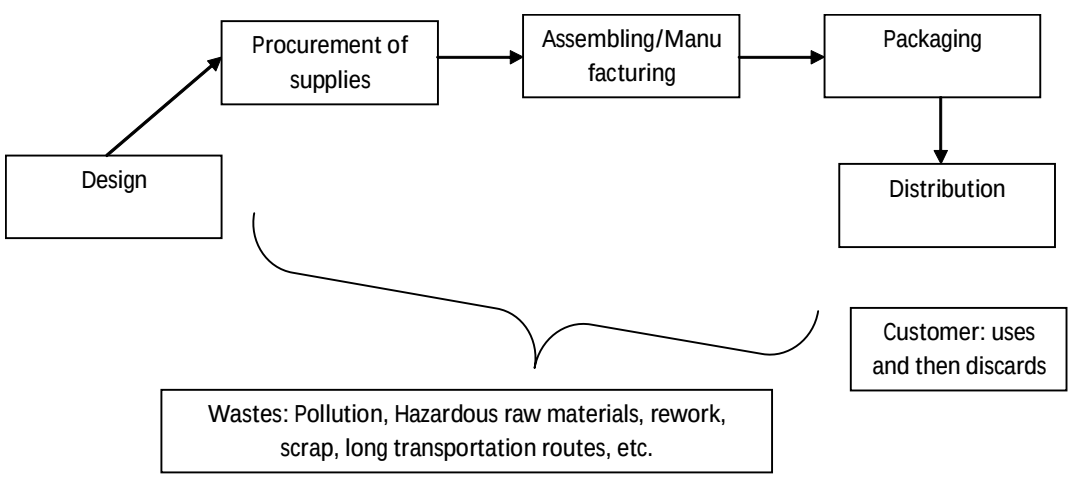


Fig: 14.7(a): Traditional Supply Chain

Reduction of wastes builds an efficient chain and reduces costs associated with loss of production incurred in wastage. A green chain excels in efficiency and productivity. Such a chain uses supplies which are non-hazardous, eco-friendly and are recyclable.

The purpose of green supply chain is to prolong the usage of the finished products so that the usage could be extended through shifting in a separate market, or use the usable parts of a product in some other product.

McDonalds has been an early adaptor of green supply chain when it used a biogas plant to process its waste. The gas was used to preheat the drier in the French fries production along with production of electricity. It replaced plastic serving packs with ecofriendly paper boxes in its outlets. In similar lines HUL in Mumbai converted its wastes to produce fertilizer from the organic wastes. The inorganic ones were recycled.

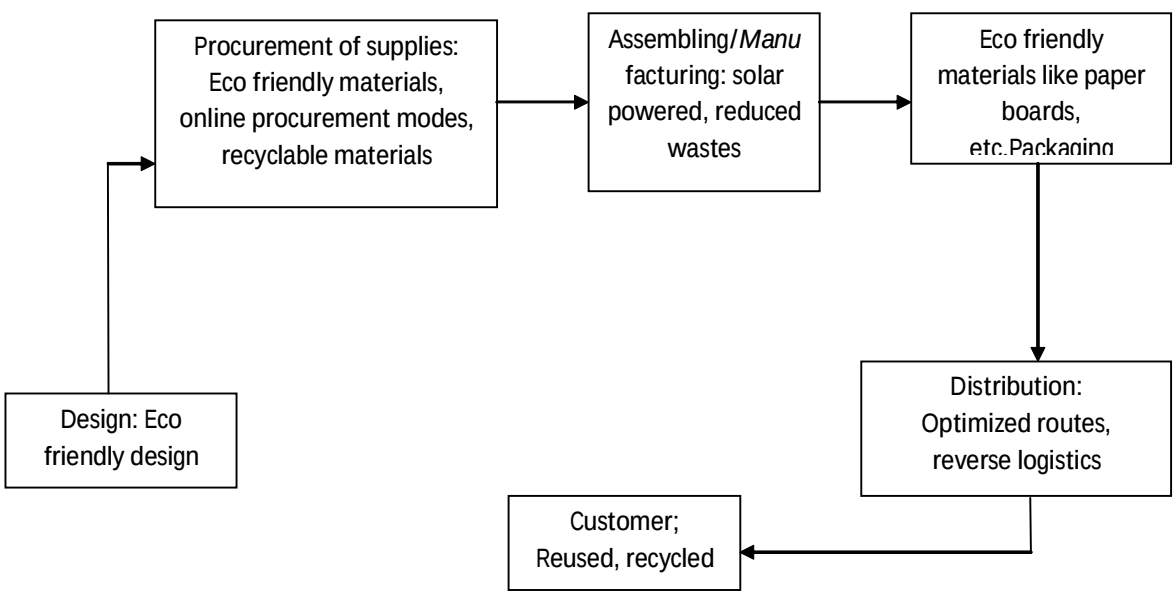


Fig: 14.7(b): Green Supply Chain

The association of a green supply chain is not merely with environmental consciousness; it is a direct function of increased profitability as well. Optimization in transportation reduces costs thereby reducing pollution, use of standardized packing materials reduces waste in packing materials, and elimination of hazardous elements in production reduces specialized handling of the products, hence cutting costs extensively. Exide

buys back the old batteries which are recycled in two smelters in Pune and Bangalore. The lead obtained through this is received in ingot form.

14.8 DISTRIBUTED RESOURCE PLANNING

Distributed Resource Planning (DRP) is a time phased plan of activities for flow of inventories downstream. The purchase requirements for inventory replenishment at branch/ retailers levels are aggregated as gross requirements at the distributor or the central warehouse levels. Sometimes referred to as Distribution Requirement planning, the process can be seen as a mirrored image of MRP. MRP deals with production of demand goods while DRP deals with distribution of finished goods in the distribution network from central distribution centres down the route to the retailers.

DRP works with forecast data from the customers and plans for inventory flow based on it in the higher levels of distribution. It uses time based order point for scheduling flow of inventory and replenishment dates for meeting delivery. In scheduling requirements at the distribution centres, it assesses the requirements through calculation of scheduled receipts, inventory in hand and goes to calculate the net requirements based on the safety stock of the centre. Lead time based calculation is done to schedule shipping dates to match quantity required.

Requisite data that is instrumental for successful implementation of DRP are:

- Demand data obtained through forecast
- Opening stock of inventory
- Scheduled receipts and the
- Safety stock

DRP logic helps to optimize inventory at the warehouses and reduces costs of shipping and stock-outs through an aggregated plan for scheduling delivery of inventory.

DRP uses both push and pull modes of operating the flow to attain high service levels from push type and schedule adequate inventory through pull generated by customer orders. Critical in the implementation of DRP

is accurate forecast. ERP processes enabled scheduling with accuracy through end-point vision in the supply chain. The coordination amongst the central, regional or branch level distribution centres can help to reduce impact of bull whip effect anywhere in the distribution flow.

14.9 WORLD CLASS SUPPLY CHAIN MANAGEMENT

Supply chain practices generally evolve in bits and pieces. However all path-breaking changes have resulted from innovations at some stage or on the entire chain. Such innovative initiations are a continuous feature at Nike which has helped it scale up its operations at a global level.

The supply chain management at Nike is world-class as evident in its worldwide presence as the top brand in the field of sport shoes which has diversified into all spheres of sports wear with equal success. The cornerstone of Nike has been innovation, its ability to see things differently. Nike has aggressively implemented lean manufacturing, a system developed by Toyota in postwar Japan that reduces manufacturing waste including time lost with inefficient tools or work procedures. It has reduced its list of raw materials alone by more than 30%.

Nike has been able to adopt the craftsmanship of an expert cobbler into its design, engineering and manufacturing process. Nike has made several innovations in its product line which have created challenges in manufacturing, logistic and transportation. The part of ordering time which could not be cut short by optimizing logistics and transportation was instead made up by innovating in manufacturing technology and automation. The result was not simply a saving of ordering time; it led to manufacturing superior performance products. It needs to be clarified that traditional manufacturing methods are still essential to Nike's supply chain.

NikeID website: Traditional supply chain order is for a thousand pairs of size 7's which are shipped in a container to a central warehouse to be distributed to a retail store. The only concept was you can buy one if you like the colour and fitting is more or less okay.

Nike lets consumers customize select sneakers through its NikeID website, where you can choose between various graphic prints and colors,

including adding your name or a personalized message. The process required frequent interruption of the factory-line flow. Once a customer places an order, it could take up to four weeks for it to travel from the factory to home. In a digital age when people communicate instantaneously, that long lag can be a turnoff. Nike wants to slash the wait time for custom orders from weeks to days. To cut this delivery time, it is working with another world class innovator "Flex" to develop efficient methods for making orders. Flex introduced a laser cutter machine which can go from cutting size 13 pieces to size 7 pieces without interrupting the factory-line flow.

FLYKNIT SHOES : Nike has introduced ultra light "Flyknit" shoes in 2012 by a novel method of knitting a virtually seamless upper from polyester yarn. The product is theoutcome of specializedsoftware being fed to computerized machines to weave structure and support into a shoe precisely where athletes need it. The shoe's upper doesn't require the usual cutting, stitching, and gluing of parts so it cuts material usage by up to 20%. It fits more like a sock over the skin.

A digital file is created for the size of a person's foot, positions requiring support, points of difference between left and right foot, etc. Each shoe is a digital file that is sent over email from the retail point to a knitting machine.

This allows automation of customized orders in a single production line. This manufacturing can be scaled up to a global level without revealing much of the intellectual property going into the actual design.

SELF LACING SHOES : In the sci-fi movie "Back to the Future", Tinker Hatfield of Nike designed a shoe which was self-lacing. Later Nike went on to make "Nike Mag", a limited production of the self-lacing sneakers sold by auction. It senses the wearer's motion to provide adaptive on-demand comfort and support. The product also reflects the philanthropic side of Nike as the proceeds of the auction were directed for Parkinson's Disease research.



CHECK YOUR PROGRESS

Q 6: State two demerits of co-makership.

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Q 7: What are the different types of e-commerce?

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14.10 LET US SUM UP

After going through the unit we have learnt the following:

- Lean manufacturing implies reduced wastes through continuous improvement. It was first implemented in Toyota Production System (TPS).
- JIT uses the principle of manufacturing and availability of required units at required quantities and at required time without any holding of inventory at any stage in the entire production process.
- Orchestration combines people, process, technology, and policies to obtain efficiency of operations and to provide satisfactory customer service.
- Supply chain operations are popularly outsourced to third party to enable the firm to focus on functions of core expertise leaving the rest to experts in the industry.
- Co-makership is the policy of working with a limited number of vendors but on a long term relationship based on mutual trust and confidence.
- Electronic Commerce is popularly known as E Commerce. It requires doing business over the internet.
- There are three different e-commerce types viz., B2C (Business to Consumer), B2B (Business to Business) and C2C (Consumer to Consumer).

- A Green Supply Chain is one in which all the supply chain activities including sourcing, manufacturing, logistics, distribution, and reverse logistics are conducted in anenvironmentally sensitive way minimizing waste at all stages.
- Distributed Resource Planning works with forecast data from the customers and plans for inventory flow based on it in the higher levels of distribution



14.11 FURTHER READING

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14.12 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Two essentials of lean manufacturing are Just-in-time and continuous improvement of processes.

Ans to Q No 2: The concept of Just -in -Time (JIT) was proposed and implemented by a shop manager TaichiOhno in Toyota Motor Company.

The philosophy uses manufacturing and availability of required units at required quantities and at required time without any holding of inventory at any stage in the entire production process.

Ans to Q No 3: TPM stands for Total Productive Maintenance (TPM). It requires an intensive quality maintenance programme. A companywide policy practices programmes for obtaining zero defects towards continuous improvement strategies.

Ans to Q No 4: Orchestrationis an integration of components within a supply chain. It combines people, process, technology, and policies to obtain efficiency of operations and provide satisfactory customer service.

Ans to Q No 5: The full forms are as below:

a) OEM – Original Equipment Manufacturer

b) VAR- ValueAdded Reseller

Ans to Q No 6: Two demerits of co-makership are:

a) Co-makership requires firms to share sensitive information which can lead to exposing confidential business information.

b) It raises the transaction cost in the form of cost of negotiation, implementation, and costs of contract execution.

Ans to Q No 7: Different types of e-commerce are

a) B2C (Business to Consumer) commerce

b) B2B (Business to Business) commerce

c) C2C (Consumer to Consumer) commerce

d) Mobile-commerce



14.13 MODEL QUESTIONS

Q 1: What is JIT? What role does it play in supply chain management?

Q 2: What are the components of orchestration?

Q 3: How has outsourcing of supply chain activities enabled firms to

enhance customer service?

Q 4: Discuss the merits and demerits of co-makership.

Q 5: What impact has e-commerce brought into the retailing activities? Discuss.

Q 6: “A green chain excels in efficiency and productivity.” Discuss.

Q 7: Explain how DRP combines push and pull strategies for planning downstream activities.

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UNIT 15: CASE STUDIES IN SUPPLY CHAIN MANAGEMENT

UNIT STRUCTURE

15.1 Learning Objectives

15.2 Introduction

15.3 Cases

- 10.5.1 Bishkoot Pau
- 10.5.2 Shyam Tea
- 10.5.3 Assam Weaves

15.4 Further Reading

15.5 Model Questions

15.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the context of supply chain problems in an organisation
- learn about the various issues rampant in an organisation and the consequences thereafter
- learn about obtaining a holistic perspective for solving real life problems.

15.2 INTRODUCTION

Supply chain problems in an organisation have a variety of consequences and surface out with effects of loss of customers, profitability, complexity in operations, etc. Analysing cases from supply chain perspective requires that the implications of the problems are understood with a holistic manner and the approach of analyzing such situations should proceed with a phased approach beginning with a thorough understanding of the minutest details in the case.

Analysis of a case is a process of discussing the situation detailed and the options that may flow from the information provided. As such there is not a single correct way of analyzing and solving cases. It is used for

understanding real life scenarios; and to work out various options that may be resorted to for analyzing the case. The correctness of the solution lies in the strength of the arguments forwarded for a particular solution.

15.3 CASE STUDIES

15.3.1 Bishkoot Pau

Bishkoot Pau is the oldest bakery in Satara established in 1890. It has earnt a name of itself in the region and the adjoining areas for its freshly baked breads and cake since its establishment and has successfully provided the best of service consistently. Initially selling rusks and breads, **Bishkoot Pau** soon added variety to its products in cookies and cakes. Eventually it became popular name with the youths for its delicious and freshly baked cakes.Parties and functions would not be complete without a cake from Bishkoot Pau.

The daily sale for breads is 12 kg. while that for rusks is 15 kgs. The quantity shoots to 15 and 20 during weekends. Of all the variants of cookies, the most popular one is the til-gur cookie. Other variants include jeera bites, karrypatta–til, gur, coconut, Horlicks, bajra bites, honey bites, etc. Its popular sliced cakes include pineapple magic, chocolate plain, walnut choco, badam mix, cinnamon popular, plain sweet and salted, lime swad and guava top. All the biscuits and sliced cakes are square in shape.

Bishkoot Pau bakes its products at the factory at 5.2 kms away from the town at the backyard of its proprietor, Mr Uttam kumar. Mr. Kumar is an established businessman with a flourishing business of transport. He has a fleet of 6 vans and 4 trucks. All his vehicles are used as hire by the vegetable wholesalers and by the sugar factories nearby. He has however kept one maxi van for his bakery and for hires within the town. The maxi van transport baked products from the factory at 8:00 AM once and later at 3:30 PM in the afternoon every day except Sundays. The rusks are brought in trays. The breads do not require trays and are stacked on the higher racks in

the vans. The other cookies are brought in trays delicately so that they do not break during the 5.2 km movement from the factory to the shop. The cakes are of 8 varieties and are arranged delicately on the trays.

Weekends are a busy days at the factory and the outlet. The customers increase mostly in the evenings and often gets sold out by 6.00-7.00 PM. The outlet is shut by 7:00 PM every Saturday due to this. A large number of customers return empty handed. The highest orders and sales during weekends are for the icing cakes, regular ready for sale as well as customised ones. The customised ordered cakes are to be accommodated in the van with great caution to avoid spread and damage of the icing and designs. Every kg of customised cake occupies the volume of 3 biscuit trays. As a result during weekends, as the number of customised cake orders increase the van has to make a third trip for bringing in the biscuits. The third trip is never full in its load since the next day being a Sunday, where all business establishments are closed. Mr Kumar does not want to store biscuits till Monday, since he strongly feels that that would costs the goodwill of the bakery, the name it has earned since generations. The cakes are all sliced cakes; baked in trays and transported in the same trays but after having marked slices in the trays.

The icing cakes are also baked in trays. The variation is in the ingredients only. The cakes have two layers with a middle layer of icing as per the cake type. The frosting on the top and sides is different for different types. Mr. Kumar uses the same trays for baking the icing cakes as well as the slice cakes. For the icing cakes, however, the tray cakes are cut accordingly in the desired shape, layered with the icing, and garnished accordingly. He has kept the designs such that the trays and baking dishes can be used for a variety of cakes. The regular icing cakes are all square.

Customers do not seek great variety in designs but the flavour and ingredients are customised for the cakes. To keep pace with the requirements of the customers Mr. Kumar sensed a great profitability

in the cakes and hired a cake artist, Rajiv who could add variety and design in the cakes to fetch great prices. The artist is dedicated in designing the cakes and in experimenting with new ingredients and flavours for the plain cakes. Rajiv has an experience of over 10 years in baking especially cakes in Mumbai. His main skill is in creating fast designs in cakes. He has worked with *Mongini's* prior to joining Bishkoot Pau for as long as 7 years. Rajiv takes no more than 40 minutes to the add designs and icing to the baked slices and to customise as per customer requirements. He need not concentrate on the plain slice cakes since those are baked as per the proportions set already from the experiments already made by Rajiv. The only need is to follow a standard follow developed by Rajiv.

Mr Kumar is concerned with the third trip the van makes these days. As the distance in between is 5.2 kms, the third trip reaches after 5:00 PM. The time is consumed in the slow speed the van has to move to prevent damage to the products particularly the cakes, the other time lost is in loading and unloading of the products. Cakes ordered for afternoon deliveries rarely reach on time. Additionally due to the special care to be taken for transporting the cakes, the delivery of biscuits are also delayed. He has seen a lot many customers waiting for the products. A couple, of weeks back the rush of customers was so high that the products had to be delivered to the customers directly from the van. The queue of customers waiting for their favourite cakes and cookies was a real concern for Kumar. Along with this he was concerned with the third trip the van has to make.A few customer complaints in the damage in the design of icings in the cakes were also received. He once pondered over shifting the factory to the vicinity of the outlet but he was concerned with the differential rent of 400 % he would incur then. The growing concern was the competitive fear from a *Mongini's* outlet at a distance of 0.8 km away.

a) What are the problems faced by Bishkoot Pau?

b) Is the rise in customers for cakes a positive indication or a

negative indication for the bakery in terms of customer service?

c) Do you think Bishkoot Pau has a responsive supply chain? Why?

d) What would you suggest Mr. Kumar for his concerns?

15.3.2 Shyam Tea

Shyam Tea is a Bought Leaf Tea Factory in the district of Golaghat adjoining the borders of Nagaland. Established in 2000, the factory has a processing capacity of 25000 tons of green leaves per day. The leaves are sourced from the small tea growers in the vicinity of the factory. The nearest one is less than 0.5 km and the farthest one is 22 kms away.

Shyam Tea sources the leaves from two agents who in turn bring the leaves from the gardens. Shyam Tea buys leaves @ Rs. 21 per kg from the agents who in turn buys green leaves @ Rs 12-14 per kg. The last four years of business have seen a fall in the profits. The profits have been falling steadily by 10-12 % each successive year. This has been a matter of concern for the owner Ms. ShyamLal.

Tea produced in bought leaf tea factories are normally seen as a down market product which faces stiff competition from the products of the established gardens. The tea produced at Shyam Tea is packed in 1, 2 and 5 kg packets and sold to tea stall owners at railway stations across the state, roadside dhabas and tea stall in and around state. It is also sold to the tea stalls and grocery stores in Nagaland, especially Dimapur and Kohima.Approximately 60 % of the total produce is sold in the grocery stores as loose tea. The tea is good in colour and finds a good market in the shops where the flow of customers is consistently high all along the day.

Of late the grocery stores were seen reluctant to stock tea from Shyam. The stores complained of quality issues expressed by the customers. Shyam Tea never targeted the upscale customers. Its customers constituted the lower income strata where quality of the

liquor matter less but tea is served as a social drink irrespective of its colour, aroma, and texture, etc. The recent reluctance of customers towards Shyam tea indicates a great deterioration in the quality of the tea and this has been a serious concern.

Mr. Shyam decided to hold a discussion with the factory in-charge Mr. Yadav in this regard. Yadav was asked to elaborate on the changes he observed in the pattern of operations, the raw materials, etc. Yadav took a time of week for analyzing and studying the scenario. He had two rounds of discussions with some of the big retailers of Shyam tea. The discussions did not throw much light on to the reasons for the reluctance other than the quality concerns in the tea.

Mr. Yadav had a discussion with the agents and realized that the distance travelled by the vans to collect the leaves was on an average of 15 kms. Besides, sometimes the vans waited in some gardens for the leaves, as a result of which there is an inconsistency in the quality of raw leaves, some were freshly plucked while others were plucked 6-7 hours early. Because of the delayed arrival of the vans for collection, the growers sometimes rushed into plucking and in the hurry the composition of the leaves were ignored by the growers. Yadav further observed that the vans loaded as much as green leaves as possible in one trip to reduce the number of trips. The high packing density in the leaves caused heating and consequently the process of withering was hastened. The hurriedly plucked leaves led to ignore the quality of the leavesplucked by the growers. Many a time, the entire stalk found its way in to the van. The matter raised questions on the supervision of Mr. Yadav as well. He had to keep a monitoring eye on the leaves brought in by the agents. Hence it was aa crucial issue for him to address the problem of falling sales.

The growers were concerned with providing quality leaves for processing. However the vans rarely came for collection at scheduled time. Consequently the growers sometimes were kept

to wait for a day before the leaves could be loaded. The growers were paid on the weight of the leaves collected. As the time after plucking increased the leaves lose moisture and fetch reduced price per kg. This compelled the growers to delay the plucking; the agents in turn further delayed their arrival, leading to a whole disruption of the schedule. There is a clear isolation in the activities of the factories, the agents, which served as logistics partners, and the producers. Yadav was pondering if the daily leaves could be sourced by an elimination of the agents; he was looking for a mechanism by which the daily leaves from each garden could be available with minimal waiting time prior to processing at the factory. Further to this, he wanted to explore the possibility of a schedule that could reduce the waiting time of the plucked leaves to prevent further damage of the green leaves. As decided Yadav met with a detailed report on the analysis he had prepared and presented to Shyam.

a) What are supply chain issues evident in the case?
b) How can the role of the agents be converted to improvise the quality of the raw materials?
c) Should Shyam Tea bypass the agents and establish a direct link with the growers? How can this be actualized?
d) What analysis did Yadav present to Shyam as a solution to enhance the sales of the tea?
e) Do you think crossdocking can be incorporated in the supply chain of the case depicted? Justify your answer.

15.3.3 Assam Weaves

Assam Weaves is a brand which has attained wide popularity in a very short period of time and deals in woven traditional women attire in Assam. The firm engages in branding and marketing of the traditional assamesemekhelachadar, sarees, waist coats, kurtas and stoles, all bearing traditional assamese motifs. The firm sources its products from a number of weavers in Tinsukia district. The firm is owned by Ms. Gita, a commerce graduate based at Tinsukia. Assam

Weaves has a facebook page in the name of “Assam Weaves for you”.

Assam Weaves cater to a variety of customers ranging from those looking for customised party wear garments to regular use ones. The sales enormously increase during Bihu and Puja where the 65 % of the sales occur during Bihu and Puja added together. The weavers bring in their products to the head office in Tinsukia town and based on the assessment of the colours, designs, etc. the products are either purchased or declined. It buys products from as many as 30 different weavers in total. During festive season, Ms. Gita provides specifications of colour, fabric compositions, design specifications to the weavers along with quantities required. She also takes pre-booking orders from customers during festive season and passes on the specifications to the weavers with the delivery schedules. She takes updates of the orders from the weavers through whatsApp.The customised orders fetch higher prices and the same is passed on to the weavers as well. The weavers are more interested in obtaining pre-booking orders as those mean confirmed sales. Since the orders are high during festive season, Ms. Gita spread the number of orders to various weavers with clear instructions on the quality. This at times created resentment among the weavers. A few of them declined to work for her. Ms. Gita rarely has any clear criteria for passing on the order to the weavers. She want to have the best products for a given set of orders at competitive prices, hence she concentratesthe customised orders to a few weavers.

During off-season, she rarely refuses products by the weavers unless those have serious quality, issues. The payments to the weavers are delayed till the products get sold. Because of the postponed payment procedures, many weavers decline to supply products to her.

Assam Weaves have two retail outlets in Tinsukia. Its prime advantage is the variety in design, fabric, and colour. Products that

fail to sell in 3 months of time are put on sale with a discount of 15-25 % to clear the stock. Every time a fresh set of products arrive she would sendpictures of the items to her previous customers in whatsApp. Ms. Gita focuseson repurchases by customers. She gives discount of 5 % to every new customer and 7 % to every successive purchase made.

Products which fail to sell eventually are returned to the weavers. Ms. Gita feels that the withdrawal of the weavers is a serious concern for her brand. She consistently feels that it is important to get the products sold at the earliest possible time to pay back the weavers. Yet sometimes the products had to be returned or had to be sold at heavy discounts of 15-25 %. The weavers bring the products once in a month and normally wait for two months on an average for payments.

The customer satisfactions, growing number of customers, the reluctance of the weavers made Ms. Gita to think of restructuring her business process. She decided to hire a management consultant to guide her settle her issues of concern.

a) What strategy is used by Ms. Gita -Push or Pull?
b) Can VMI be a solution to Assam Weaves? How
c) What problems do you think are evident in the procurement process?
d) Do you think Ms. Gita should have separate strategies for festive seasons and off – seasons? Why?



15.4 FURTHER READING

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15.5 MODEL QUESTIONS

Q 1: How can Bishkoot Pau introduce business process reengineering into practice?

Q 2: "Postponement can be a strategy in Bishkoot Pau." Justify?

Q 3: What analysis did Mr. Yadav present to Shyam for eliminating the role of agents?

Q 4: EDI can guide Mr. Yadav solve his problem. Discuss.

Q 5: How according to you Assam Weaves performed in terms of responsiveness of a supply chain?

Q 6: Suppose you are consulted to help Ms. Gita to streamline her business process. What would be your suggestion to her ?



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Learner's Feedback on Course

Dear Learner,

Regarding the course as mentioned above, we would like to know your opinions and comments so as to improve the quality of self learning materials in future. Please respond to the following statements by ticking the number you feel most reflect your opinion. After completion of the additional comments, please detach the page and send/mail the same to us at the address given below.

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1. Approximately how many hours did you spend for studying the units in the course? | | | |
2. Please give your opinions (by √ mark) to the following items based on your reading of the block:

Sl. No.	Statements	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I.	The SLMs of the course fulfil the learning objectives set out in the beginning of each unit					
II.	The units of the SLM could satisfy my academic needs and expectations					
III.	The Unit writers have excellent knowledge about the course contents					
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VIII.	The self check questions are very helpful					
IX.	The Possible/model questions and the answers to check my progress have benefited me a lot					

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1. Which aspects of the SLM, according to you, worked well?

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2. What sort of changes/improvements do you feel KKHSOU could implement to improve the overall quality of the SLM?

Thank you for taking the time to complete this form.

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