



UNIT-2

Planning for Supply Chain Operations

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Discuss the Planning & Sourcing Operations in logistics.
- ✓ Assess the importance of Inventory Management(Plan)

Unit 2

Planning for Supply Chain Operations

A fundamental model of Supply Chain Operations consist of four classes of operations:

1. Plan
2. Source
3. Make
4. Deliver

Plan

This means all the operations that are required to plan and systematize the operations in the other three classifications.

We will examine three operations in this class in detail:

- demand forecasting;
- product pricing; and
- Inventory management.

Source

Operations in this class consist of the activities essential to obtain the inputs to make products or services. We examine two operations here. Procurement is the purchase of materials and services. Credit and collections is not usually taken as a sourcing activity, however, it can be thought of as, exactly, the gaining of cash. Both these operations hold a big influence on the supply chain effectiveness and efficiency.

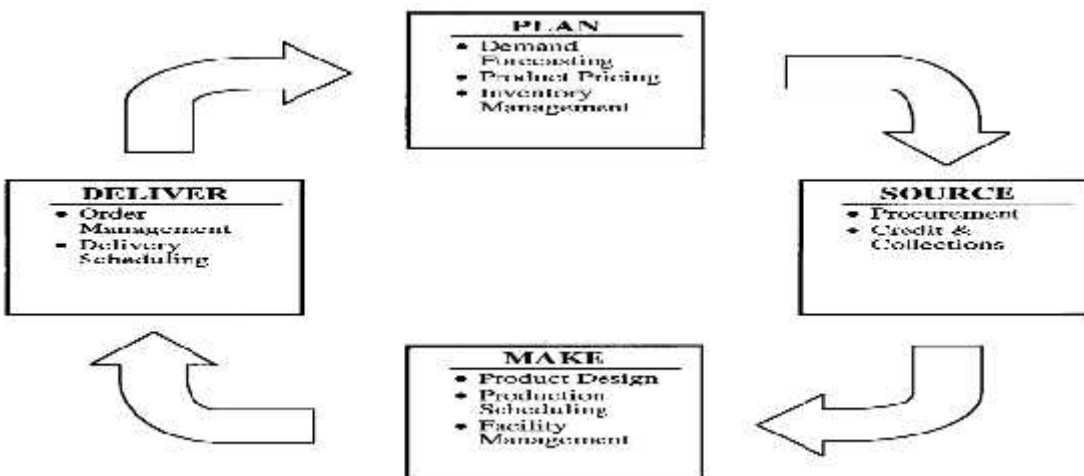


Fig: 2.1Fig Four Categories of Supply Chain Operations

Make

This group includes the operations necessary to build up and expand the products and services that a supply chain offers.

Operations that we talk about in this class are:

- Product Design
- Production Management
- Facility and Management

The SCOR Model does not particularly consist of the product design and expansion process but it is included here since it is essential to the production procedure.

Deliver

These operations include the activities that are element of receiving client orders and delivering products to them.

The three operations we evaluate are:

- Management
- Product Delivery
- Return Processing

These are those operations that create the core connections between organizations in a supply chain.

Demand Forecasting and Planning

Decisions in supply chain depend on the forecasts that identify which products will be required, what amount of these products will be needed, and when they will be required.

The demand forecast becomes the basis for companies to plan their internal operations and to cooperate among each other to meet market demand.

All forecasts deal with four major variables which together determine what market conditions will be like.

Those variables are:

1. Supply
2. Demand
3. Product Characteristics
4. Competitive Environment

Supply is calculated by the number of manufacturers of a product and by the lead times that are linked with a product. The more manufacturers there are of a product and the shorter the lead times, the more expected this variable is. When there are just a few suppliers or when lead times are longer, there is more possibility of ambiguity in a market. Like variability in demand, ambiguity in supply makes predicting trickier. Also, longer lead times linked with a product need a longer time prospect over which forecasts must be completed. Supply chain forecasts must cover a time period that encompasses the mutual lead times of all the components that go into the formation of a final product.

Demand means the overall market demand for a collection of related products or services. Is the market going upward or declining? If so, what is the annual or periodical rate of expansion or decline? Or perhaps, the market is comparatively mature and demand is stable at a level that has been expected for some period of years. Also, a lot of products have a seasonal demand model. For instance, snow skis and heating oil are in greater demand in the winter season while tennis rackets and sun screen have more demand in the season of summer. Maybe the market is a developing market—the products or services are innovative and there is not much chronological data on demand or the demand changes widely since new customers are just being introduced to the products. Markets where there is small historical data and lots of unpredictability are the most hard when it comes to demand predictions.

Product features include the characteristics of a product that affect consumer demand for the product. Is the product innovative and developing fast like a lot of electronic products or is the product grown-up and changing gradually or not at all, as is the case with numerous commodity products? Forecasts for grown-up products can be of longer timeframes than forecasts for products that develop rapidly. It is also significant to know whether manufactured goods will steal demand away from a different product.

Can it be used as an alternative for another product? Or will the utilization of a product drive the matching use of an associated product? Products that either struggle with or balance each other should be predicted together.

Competitive environment stands for the activities of a corporation and its competitors. What is the market share of a business? In spite of whether the total size of a market is increasing or shrinking, what is the movement in an individual company's market share? Is it rising or declining?

What is the market share inclination of competitors? Market share trends are influenced by product advertising and price wars, so forecasts must consider events that are planned for the forthcoming period. Forecasts must also account for predictable promotions and price wars that will be beginning by competitors.

Forecasting Methods

There are four fundamental methods to employ when doing forecasts. Most forecasts are completed by using a variety of combinations of these four methods.

Chopra and Meindl describe these methods as:

1. Time Series
2. Simulation
3. Qualitative
4. Causal

Qualitative Methods depend upon a person's perception or subjective views about a market. These methods are most suitable when there is little past data available to work with. When a new line of products is launched, people can formulate forecasts on the basis of comparisons with other products or conditions that they consider alike. Using production adoption curves people can predict what will occur in the market.

Other more fundamental methods of forecasting presume that demand is strongly related to particular environmental or market factors. For instance, demand for commercial loans is often closely associated with interest rates. So if interest rate cuts are expected in the next period of time, then loan forecasts can be derived using a causal relationship with interest rates. Another strong fundamental relationship is present between price and demand. If prices are lowered, demand can be expected to increase and if prices are raised, demand can be expected to fall.

Time series approaches are the most general type of forecasting. They are based on the supposition that past patterns of demand are a fine sign of future demand. These methods are finest when there is a dependable body of past data and the markets being predicted are steady and have demand patterns that do not differ much from one year to the subsequent. Mathematical techniques like moving averages and exponential smoothing are utilized to make forecasts on the basis of time series data. These techniques are engaged by most of the forecasting software packages.

Simulation Methods utilize combinations of fundamental and time series means to replicate the behavior of customers under diverse circumstances. This technique can be employed to answer questions like what will happen to proceeds if prices on a line of products are decreased or what will occur to market share if a competitor introduces a challenging product or opens a store in close proximity.

Few companies use only one of these means when forecasting demand. Most corporations do different forecasts using diversified methods and then, they compile the information gathered through different forecasts and apply this to map their business. Studies have revealed that this procedure of creating forecasts using diverse methods and then joining the results into a concluding forecast generally produces superior accuracy than the yield of any one method alone.

In spite of the forecasting methods utilized, when doing forecasts and appraising their results, it is important to keep numerous things in mind – especially the fact that short-term predictions are essentially more precise than long-term forecasts.

Collective forecasts are more precise than forecasts for individual products or for minor market segments. For instance, yearly forecasts for soft drink sales in a given urban area are quite correct but when these forecasts are broken down to sales by districts within that urban area, they turn out to be less precise. Aggregate forecasts are done using a wide base of data that provides superior forecasting accuracy. As a rule, the more closely focused or exact a forecast is, the less data is accessible and the more changeability there is in the data, so the accurateness is diminished.

Lastly, forecasts are always incorrect to a bigger or smaller degree. There are no ideal forecasts and businesses require assigning some predictable degree of error to each forecast. A precise forecast might have a degree of fault that is plus or minus 5 percent. A more tentative prediction might have a plus or minus 20 percent degree of error. It is significant to know the degree of error as a business must have emergency plans to face those outcomes. What would a corporation do if raw material prices got 5 percent higher than estimated? What would it do if demand was 20 percent higher than anticipated?

The Four Forecasting Variables

• Supply	Amount of Product Available
• Demand	Overall Market Demand for product
• Product Characteristics	Product Features that influence demand
• Competitive Environment	Actions of product suppliers in the market

The Four Forecasting Methods

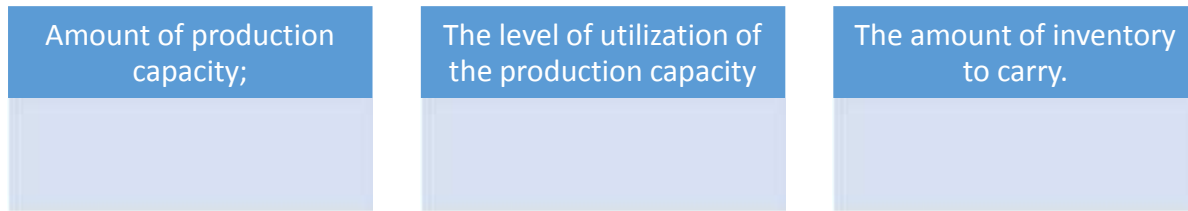
• Qualitative	Relies on a person’s intuition or opinions
• Casual	Assumes that demand is strongly related to certain factors
• Time Series	Based on historical demand patterns
• Simulations	Combines casual and time series methods

Aggregate Planning

Once demand forecasts have been formed, the next stage is to generate a plan for the business to meet the predictable demand. This is termed as aggregate planning and its function is to assure demand in a way that can maximizes revenue for the corporation. The planning is done at the collective level and not at the level of individual stock keeping units (SKUs). It sets the best levels of production and stock that will be implemented over the next 3 - to - 18 months.

The aggregate plan is the frame within which short-term decisions are taken about production, stock, and distribution. Production decisions engage setting parameters like the rate of manufacturing and the amount of production capability to use, the volume of the workforce, and how much subcontracting and overtime to use. Inventory decisions can be how much demand will be served right away by stock on hand and how much demand can be met later and turned into backlogged orders. Distribution decisions describe how and when product will be shifted from the place of production to the site where it will be used or acquired by customers. There are three fundamental approaches to take in creating the collective plan.

They involve trade-offs among three variables, which are:



Let's examine these three approaches briefly.

(1) Use Production Capacity to Match Demand.

In this method the total capacity of production is matched to the level of demand. The purpose here is to use 100 percent of production capacity at all times. This is attained by adding or abolishing plant capacity as required and hiring and laying off workers, as needed. This method results in short levels of stock but it can be very costly to execute if the cost of adding or dropping plant capacity is high. It is also often troublesome and uncomfortable to the labor force if people are continually being hired or fired in response to rises and falls in demand. This method works best when the cost of moving inventory is high and the cost of shifting capacity—workforce and plant—is low.

(2) Utilize Varying Levels of Total Capacity to Match Demand.

This model can be utilized if there is surplus manufacturing capacity available. If on hand plants are not employed 24 hours a day and 7 days a week then there is a chance to meet varying demand by increasing or decreasing consumption of production capacity. The size of the labor force can be maintained at a stable rate and flexible work scheduling and overtime used to go with production rates. The consequence is low levels of stock and also lower average levels of capacity use. The approach is logical when the outlay of carrying inventory is high and the expenditure of surplus capacity is comparatively low.

(3) Use Inventory and Backlogs to Match Demand.

Using this method provides for constancy in the plant capacity and labor force and enables a steady rate of output. Production is not coordinated with demand. Instead stock is either built up during periods of low demand in expectation of future demand or stock is allowed to run low and backlogs are built up in one stage to be packed in a following period. This method results in higher capacity consumption and lower costs of varying capacity but it does make large inventories and backlogs with time as demand changes. It should be utilized when the price of capacity and altering capacity is high and the expenditure of carrying stock and backlogs is fairly low.

Product Pricing (Plan)

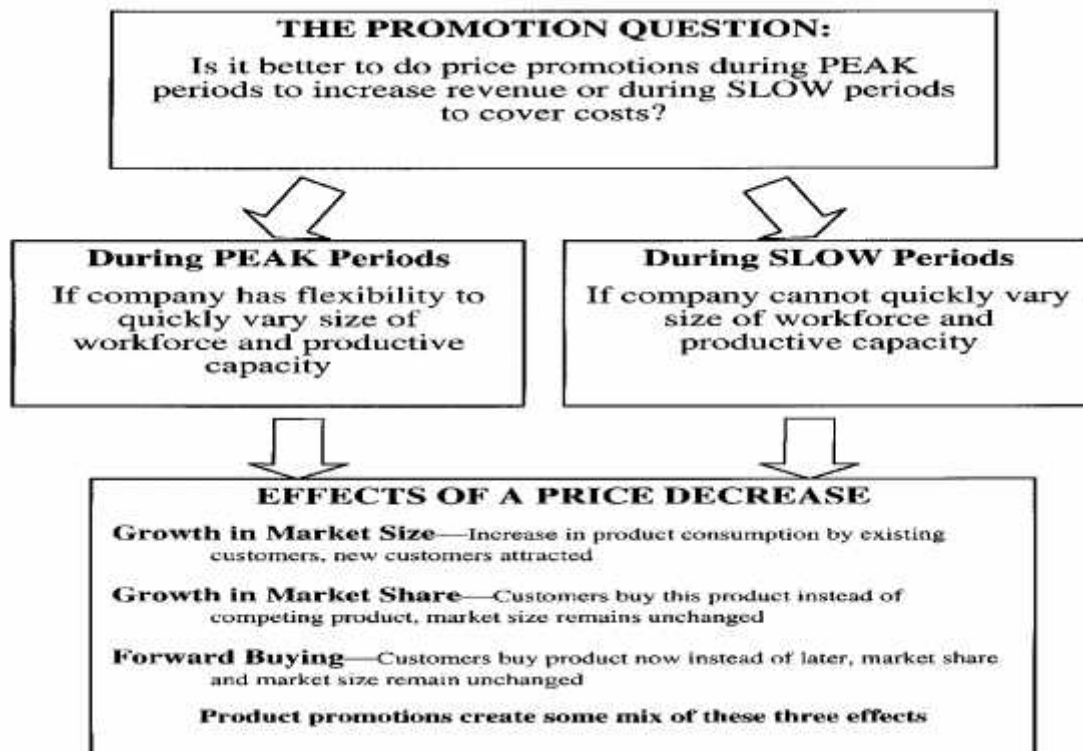
Companies and whole supply chains can pressurize demand over time by using price. Depending on how price is utilized, it will be inclined to either exploit revenue or gross profit. Typically advertising and salespeople desire to take pricing decisions that will kindle demand during climax seasons. The objective here is to make maximum total revenue. Often financial or manufacturing people want to make pricing decisions that arouse demand during low periods. Their plan is to maximize gross profit in crest demand periods and make revenue to cover costs during low demand periods.

Relationship of Cost Structure to Pricing

Every business needs to ask the following question, “ is it better to do price advertising during peak periods to boost revenue or during low period to face costs?”

The answer depends on the cost structure of the company. If a company has flexibility to differ the size of its personnel and productive facility and the cost of carrying stock is high, then it is finest to generate more demand in peak seasons. If there is less flexibility to fluctuate workforce and capacity and if expenditure to carry stock is low, it is best to make demand in low periods.

These companies are normally motivated to run advertising in peak periods to motivate demand even more. Since they can rapidly boost production levels, a lessening in the profit margin can be made up for by an increase in overall sales if they are able to sell all of the products that they make.



Inventory Management (Plan)

Inventory Management is a collection of techniques that are applied to supervise the inventory levels within dissimilar companies in a supply chain. The objective is to decrease the cost of stock as much as possible while still maintaining the levels of service that customers need. Inventory management takes its main inputs from the demand predictions for products and the prices of products. With these two inputs, stock management is a constant procedure of balancing product inventory levels to serve demand and gaining economies of scale to get the best product prices.

As discussed previously there are three types of inventory:

- (1) Cycle inventory
- (2) Seasonal inventory
- (3) Safety inventory

Both Cycle Inventory and Seasonal Inventory are affected by economy of scale concerns. The cost structure of the businesses in any supply chain will propose certain levels of stock on the basis of production costs and stock carrying cost. Safety Inventory is affected by the certainty of product demand. The less expected product demand is the superior the level of Safety Inventory is necessary to cover unanticipated changes in demand. The Inventory Management Operation in a business or a complete supply chain consists of a mix of activities related to running the three diverse kinds of inventory. Every type of inventory has its own detailed challenges and the combination of these challenges will differ from one business to another and from one supply chain to another.

Cycle Inventory

This is the type of inventory, which is needed to meet the demand of the product over the time period between placing orders for the product. Cycle Inventory is essential because economies of scale craft it attractive to make smaller number orders of big quantities of a product rather than permanent orders of little product quantity. The end use consumer of a product might actually utilize a product in constant small amounts all over the year. But the distributor and the producer of that product might find it cheaper to make and stock the product in huge batches that do not match the consumption pattern.

Cycle inventory is the accumulation of inventory in the supply chains because of the fact that production and stocking of stock is done in lot sizes that are bigger than the constant demand for the product. For instance, a distributor might experience an enduring demand for Item A that is 100 units per week. The distributor finds, though, that it is cheapest to order in batches of 650 units. Every six weeks or so, the distributor sets an order causing cycle stock to build up in the distributor's warehouse at the start of the ordering period. The producer of Item A may find that it is most proficient for them to produce in batches of 14,000 units at a time. This also results in buildup of cycle stock at the manufacturer's site.

Seasonal Inventory

Seasonal Inventory occurs when a corporation or a supply chain with a predetermined amount of productive capacity chooses to create and stock products in expectation of future demand. If future demand is going to exceed productive capacity, then the answer is to produce products in times of low demand that can be put into inventory to meet the high demand in the future.

Decisions about seasonal inventory are driven by a need to get the most excellent economies of scale given the capacity and cost arrangement of every company in the supply chain. If it is costly for a producer to boost productive capacity, then, the capacity can be considered as a fixed rate.

Once the yearly's demand for the manufacturer's products is determined, the most efficient schedule to exploit that fixed capacity can be measured. This schedule will call for Seasonal Inventory. Managing seasonal stocks calls for demand predictions to be precise since large amounts of stocks can be built up this way and it can turn out to be outdated or holding costs can mount if the stock is not sold off as expected. Managing seasonal stock also calls for manufacturers to recommend price incentives to influence distributors to buy it and put it in their warehouses well before demand for it arises.

Safety Inventory

Safety Inventory is essential to balance the ambiguity that is present in a supply chain. Retailers and distributors do not like to run short of inventory in the face of unanticipated customer demand or unforeseen delay in getting replenishment orders so they carry safety stock on hand. As a rule, the higher the level of ambiguity, the higher the level of safety stock that is essential.

Procurement (Source)

Usually, the major activities of a procurement executive were to beat up possible suppliers on price and then purchase products from the lowest cost supplier that was available. That is still a significant activity, but there are other activities that are becoming equally important. Because of this, the purchasing activity is now taken as part of a broader task called procurement.

The Procurement Function can be divided into five major activity categories:

1. Purchasing
2. Consumption Management
3. Vendor Selection
4. Contract Negotiation
5. Contract Management

Purchasing

These activities are the normal activities linked to issuing purchase orders for required products. There are two kinds of products that a company buys: (1) direct or planned materials that are required to make

the products that the business sells to its consumers; and (2) indirect or MRO (Maintenance, Repair, and Operations) products that a business uses as part of everyday operations. The mechanics of buying both types of products are mainly the same. Purchasing decisions are taken, purchase orders are placed, vendors are contacted, and orders are delivered. There is a lot of data exchanged in this procedure between the purchaser and the supplier— prices, items and quantities ordered, delivery dates, delivery addresses, billing addresses, and payment terms.

One of the biggest challenges of the buying activity is to see whether this data communication is happening in a timely way and without fault. Much of this activity is quite unsurprising and follows distinct routines.

Consumption Management

Effective procurement starts with a thought of how much of what classifications of products are being bought across the whole company as well as by every operating unit. There must be an understanding of how much of what types of products are purchased from whom and at what prices.

Anticipated levels of expenditure for diverse products at the different locations of a business should be placed and then compared against real consumption on a usual basis. When consumption is considerably above or under expectations, this should be taken to the attention of the suitable parties so probable causes can be examined and correct actions taken. Consumption above expectations is either a problem to be rectified or it reflects wrong expectations that are required to be reset. Expenditure below expectations might point to a chance that should be exploited or it also might simply reveal incorrect expectations to start with.

Vendor Selection

There must be a continuous procedure to explain the procurement capabilities required to support the company's business strategy and its operating structure. This definition will give insight into the comparative significance of supplier's capabilities. In addition to the price of a vendor's product the value of these capabilities has to be measured as well. The value of product class, service levels, just in time delivery, and mechanical support can simply be estimated in light of business plan and the company's operating model.

Contract Negotiation

As a specific need for a business arises, contracts must be discussed with individual suppliers on the chosen vendor list. This is where the particular items, prices, and service levels are carried out. The simplest negotiations are those agreements where vendors are selected on the basis of lowest prices. The most multifaceted negotiations are for agreements to buy direct materials that must gather exacting quality essentials and where high service levels and mechanical support are required.

Suppliers of both direct and indirect materials require a regular set of capabilities. Gaining more purchasing efficiencies needs that suppliers of these products have the abilities to set up electronic links

for purposes of getting orders, conveying delivery notifications, sending invoices, and getting payments. Better inventory management wants that inventory levels be lowered down, which often means suppliers require making more recurrent and smaller deliveries and orders must be placed accurately and absolutely.

All these necessities need to be discussed in addition to the fundamental issues of products and prices. The discussions must make tradeoffs between the unit price of a product and all the other value added services that are necessary. These other services can either be paid for by a higher margin in the unit price, or by separate payments, or by some blend of the two. Performance targets, penalties and other fees must be defined when these targets are not met.

Contract Management

Once contracts are placed into action, supplier performance against these contracts should be measured and administered. Because businesses are shortening their suppliers' base, the performance of every supplier that is selected becomes more important. A particular contractor might be the only source of an entire group of products that a business wants and if the supplier not meeting its contractual obligations, the activities that depend on those products will be negatively suffered.

A company needs the skill to follow the performance of its suppliers and hold them responsible to meet the service levels as agreed in the contract. Just as with consumption management, people in a business need to regularly gather data regarding performance of suppliers. Any supplier that constantly falls below standards should be made conscious of their shortcomings and asked to make them right.

Credit and Collections (Source)

Credit and Collections is the sourcing procedure that a company employs to acquire its money. The credit operation examines potential consumers to make sure that their company only conducts business with consumers who will be able to pay their bills. The Collections Operation is what in fact brings in the money that the corporation has earned.

The supply chains that a business participates in are often chosen on the basis of credit decisions. Most of the faith and cooperation that is potential between companies who do business jointly is based upon good credit ratings and well-timed payments of invoices. Credit decisions influence who a company will sell to and also, the terms of the sale.

The Credit and Collections task can be broken into three major categories of activity:

1. Set Credit Policy
2. Implement Credit and Collections Practices
3. Manage Credit Risk

Set Credit Policy

Credit Policy is made by senior managers in a business such as the Controller, Treasurer, Chief Financial Officer, and Chief Executive Officer. The primary step in this procedure is to evaluate the performance of the company's receivables. Every corporation has distinct a set of measurements that they employ to examine their receivables, such as the following: Days Sales Outstanding (DSO); percent of receivables, which are past customer payment terms; and bad debt write-off amount as percent of sales.

What are the trends?

Where there are problems?

Once management starts understanding of the company's receivables position and the trends affect that state, they can take the subsequent step which is to set or alter the risk acceptance criterion to react to the position of the company's receivables.

Implement Credit and Collections Practices

These activities mean putting in rest and operating the events that will execute and impose the credit policies of the corporation. The first main activity in this type is to work with the business salespeople to approve sales to particular customers. As noted earlier, making a sale is like making a loan for the amount of the sale. Consumers often purchase from a company since that company extends them bigger lines of credit and longer payment terms than its participants. Credit investigation goes a long way to promise that this loan is merely made to consumers who will pay it off punctually as called for by the terms of the sale.

After a sale is made, people in the credit area work with customers to provide a variety of services; they work with consumers to develop product returns and issue credit memos for returned products, they work with consumers to determine disputes and clear up queries by issuing copies of contracts, purchase orders, and invoices. The third main activity that is performed is collections; this is a procedure that starts with the constant maintenance of every customer's accounts payable status. Customers that have past due accounts are contacted and payments are requested. Sometimes new terms and schedules are negotiated for the payments.

Manage Credit Risk

The credit function works to aid the company take intelligent risks that maintain its business plan. What may be an awful credit decision from one viewpoint might be a good business decision from some another perspective. If a business wants to expand market share in a definite area it might make credit decisions that assist it to do so. Credit people work with other people in the company to find new ways to lower the danger of selling to new types of customers. Payment terms that are good-looking to consumers in these market segments can be devised. Credit risks can be decreased by the use of credit insurance, liens on consumer assets, and government loan guarantees for exports.

For main customers and chiefly large individual sales, people in the credit area work with others in the business to structure particular deals just for a single consumer. This increases the worth that the business can offer to such a consumer and can be an important part of securing a new business.

Further Reading:

- ✓ *Michael H. Hugos, (2006), Essentials of Supply Chain Management*
- ✓ *B. Mahadevan, (2010), Operations Management: Theory and Practice*
- ✓ *Christine V. Bullen, Richard LeFave, Gad J. Selig, (2010), Implementing Strategic Sourcing: A Manager's Guide to World Class Best Practices*
- ✓ *Bozarth, (2006), Introduction to Operations and Supply Chain Management*