UNIT-4 Planning & Sourcing 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 4

Planning & Sourcing Operations

The basic model of Supply Chain Operations consist of four classes of operations:

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

Plan

This refers to 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
- Inventory management

Source

Operations in this class comprise the activities that are 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, specifically, the gaining of cash. Both these operations have a big influence on the supply chain's effectiveness and efficiency.

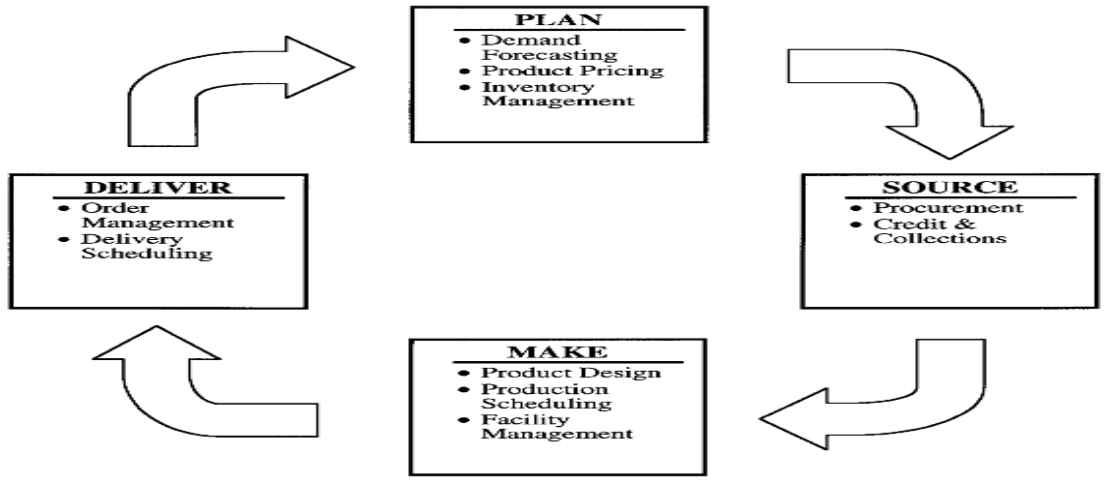


Fig: 4.1Fig Four Categories of Supply Chain Operations

Make

This group includes the operations necessary to build 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 involved in receiving client orders and delivering products to them.

The three operations we evaluate are:

- Management
- Product Delivery
- Returns Processing

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

Demand Forecasting and Planning

Decisions in a 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 with 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 accurately trickier. Also, longer lead times linked with a product require a longer time period 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 expanding 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, skis and heating oil are in greater demand in the winter season, while tennis rackets and sunscreen experience more demand in the summer season. Maybe the market is a developing market—the products or services are innovative and there is not sufficient chronological data on demand, or demand changes widely as new customers are just being introduced to the products. Markets where there is limited historical data and extensive unpredictability are the most challenging 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 mature and changing gradually or not at all, as is the case with various commodity products? Forecasts for mature products can be made over longer timeframes than forecasts for products that develop rapidly. It is also important to know whether manufactured goods will steal demand away from other products.

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

Competitive environment refers to the activities of a corporation and its competitors. What is the market share of a business? Irrespective of whether the total size of a market is increasing or decreasing, what is the movement in an individual company's market share? Is it rising or declining?

What is the market share position 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 started by competitors.

Forecasting Methods

There are four fundamental methods for carrying out 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, a business 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 any given period of time, loan forecasts can be produced using the causal connection with interest rates. Another important fundamental relationship exists 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 presumption that past patterns of demand are a good sign of future demand. These methods are most effective when there is a dependable body of past data, the markets being predicted are steady and demand patterns are evident that do not differ much from one year to the next. 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 modern forecasting software packages.

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

Few companies use only one of these means when forecasting demand. Most corporations carry out a variety of forecasts using diversified methods, after which they compile the information gathered through the different forecasts and use 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 focusing on any one method alone.

Regardless of the forecasting methods utilized when carrying out forecasts and analyzing their results, it is important to keep a few 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 accurate, 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, which reduces accuracy.

Lastly, forecasts are always incorrect to a large or small degree. There are no flawless forecasts and businesses must therefore accept and expect a predictable degree of error for 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 important to know the degree of error as a business must have contingency plans to deal with such outcomes. What would a corporation do if raw material prices got 5 percent higher than estimated? What would happen if demand was 20 percent higher than anticipated?

The Four Forecasting Variables

• Supply	Amount of product available
• Demand	Overall market demand for the 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 predicted demand. This is termed as aggregate planning and its function is to assure demand in a way that can maximize revenue for the business. 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 three to 18 months.

The aggregate plan is the frame within which short-term decisions are taken about production, stock and distribution. Production decisions involve setting parameters like the rate of manufacturing and the amount of production capability to use, the size 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 as backlogged orders. Distribution decisions describe how and when products will be shifted from the place of production to the site where they will be used or acquired by customers. There are three basic approaches to the creation of the collective plan.

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

Amount of production capacity	The level of utilization of the production capacity	The amount of inventory to carry

Let's examine these three approaches briefly.

(1) Use Production Capacity to Match Demand.

a. 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, hiring and laying off workers as needed. This method results in low 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 difficult and problematic 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 in use 24 hours a day and 7 days a week, it may be possible 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 implemented 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 cost of 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 a level of 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 filled in a following period. This method results in higher capacity consumption and lower costs of varying capacity, but it does make for large inventories and backlogs 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)

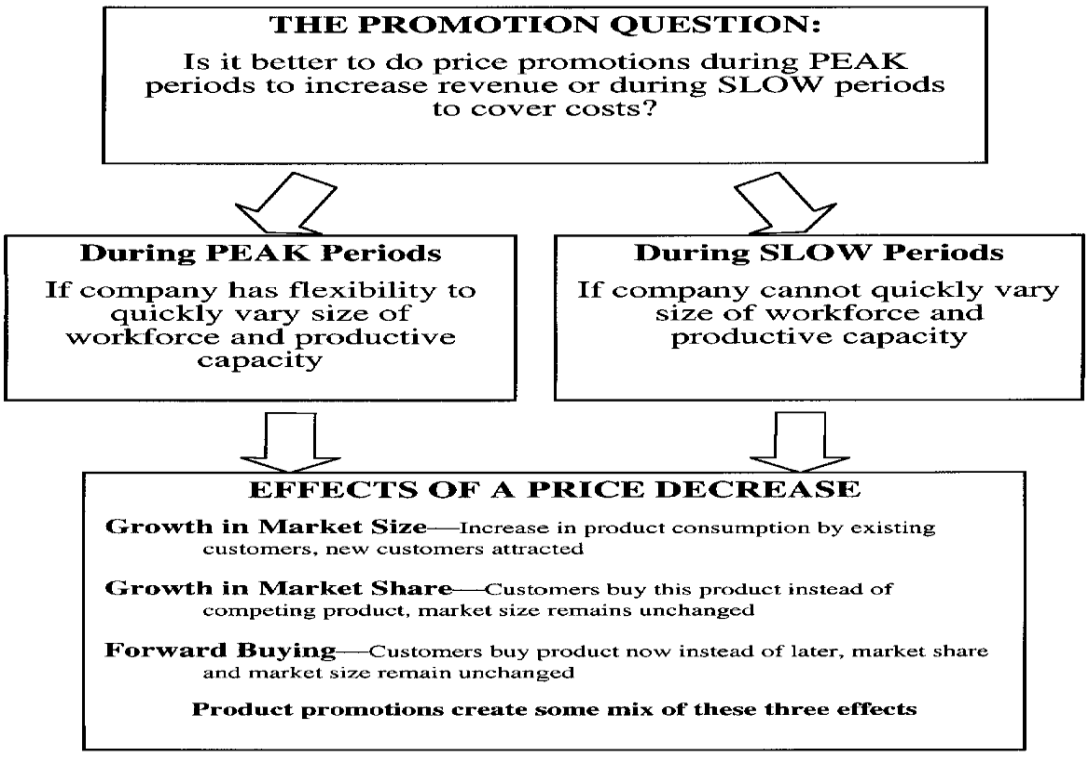
Companies and whole supply chains can encourage and increase demand over time by manipulating price. Depending on how price is utilized, it can have an effect on revenue or gross profit. Typically, advertising and salespeople try to make savvy pricing decisions that will have the most positive impact during the relevant buying seasons. The objective here is to make maximum total revenue. Oftentimes, those working in financial or manufacturing capacities want to make pricing decisions that spur demand during low periods. Their intention is to maximize gross profit in peak 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 implement price advertising during peak periods to boost revenue, or during low periods to reduce costs?”

The answer depends on the cost structure of the company. If a company has the flexibility to alter the size of its personnel and productive facility *and* the cost of carrying stock is high, then it is most effective to generate more demand in peak seasons. If there is less workforce and capacity flexibility and if the costs of carrying stock are low, it is best to nurture demand in low periods.

Companies are normally motivated to run advertising in peak periods to motivate demand even more. Since they can rapidly boost production levels, a reduction in profit margins 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 manage 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 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 process 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. 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 predictable product demand is, the higher the level of safety inventory required to cover unanticipated changes in demand. The inventory management operation in a business or the complete supply chain consists of a mix of activities, all related to running the three differnet kinds of inventory. Every type of inventory has its own specific 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 demand for the product over the time period *between* placing orders for the product. Cycle inventory is essential because economies of scale craft deem it efficient to make less frequent orders of larger quantities of a product, rather than permanent orders of smaller product quantities. The end-consumer of a product may well utilize a product in constant small amounts all over the year. Nevertheless, 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 supply chains, which occurs because production and stocking of items is done in lot/batch sizes that are bigger than the ongoing demand for the product. For instance, a distributor might experience an increase in demand for Item A that is 100 units per week. The distributor then finds that it is cheapest to order in batches of 650 units. Every six weeks or so, the distributor issues an order which in turn causes cycle stock to build up in the distributor's warehouse at the start of the ordering period. Likewise, 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 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, the solution is to produce products in times of low demand that can be put into inventory to meet the higher demand in the future.

Decisions about seasonal inventory are driven by the need to get the very best economies of scale, in accordance with the capacity and cost arrangement of every company in the supply chain. If it is costly for a producer to boost productive capacity, their capacity can be considered as a fixed.

Once the yearly demand for the manufacturer's products is determined, the most efficient schedule to make use of its fixed capacity can be determined. This schedule will make allowances for seasonal inventory. Managing seasonal stock requires demand predictions to be precise, because large amounts of stock can be built up this way and runs the risk of becoming outdated or expensive to hold onto if the stock is not sold off as expected. Managing seasonal stock also requires manufacturers to recommend price incentives, in order to influence distributors to buy it and store it in their warehouses long before demand for it begins to grow.

Safety Inventory

Safety inventory is essential to balance the uncertainty that exists in every supply chain. Retailers and distributors do not like to run short of inventory due to unanticipated customer demand or unforeseen delays in acquiring stock replenishments, so they always carry a set level of safety stock on hand. As a rule of thumb, the higher the level of uncertainty, the higher the level of safety stock that must be carried.

Procurement (Source)

Traditionally, the sole priority of a procurement executive was to negotiative with all possible suppliers on price and then purchase products from the lowest cost supplier available. This is still an important activity, but there are other elements to the process that are becoming equally important. Because of this, 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 are the typical 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; (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 process 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 assessing whether this data communication is happening in a timely way and without fault. Much of this activity is familiar, predictable and follows distinct routines.

Consumption Management

Effective procurement starts with consideration 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, before being compared against real consumption on normal basis. When consumption is

considerably above or under expectations, this should be brought to the attention of the suitable parties to identify probable causes and ensure the appropriate action is taken. Expenditure above expectations may represent an error to be addressed or a reflection of inaccurate projections that may need to be adjusted. Expenditure below expectations may highlight an opportunity to be exploited, or it may likewise simply reveal incorrect expectations/projections 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 must also be measured. The value of product class, service levels, just-in-time delivery and mechanical support can simply be estimated in light of the 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 discussed. The simplest negotiations are those agreements where vendors are selected on the basis of lowest prices. The most challenging negotiations are those for agreements that combine low prices, high quality, the highest levels of service and the provision of mechanical support.

Suppliers of both direct and indirect materials require a regular set of capabilities. Gaining more purchasing efficiencies means that suppliers of these products have the abilities to set up electronic links for purposes of taking orders, conveying delivery notifications, sending invoices and receiving payments. Better inventory management works to reduce inventory levels, which often means suppliers are required to make more recurrent and smaller deliveries and flawless accuracy of orders.

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

Contract Management

Once contracts are put into action, supplier performance against these contracts should be measured and managed. Because businesses for the most part are scaling down their suppliers' base, the performance of every supplier that is selected becomes even more important. A particular contractor might be the *only* source of an entire group of products that a business needs. If the supplier is not meeting its contractual obligations, the activities that depend on those products will be negatively affected.

A company needs certain skills to monitor the performance of its suppliers and hold them responsible for meeting service levels as agreed in the contract. Just as with consumption management, people in a business need to regularly gather data regarding the performance of their suppliers. Any supplier that routinely falls below agreed standards should be made aware of their shortcomings and asked to rectify them.

Credit and Collections (Source)

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

The supply chains that a business participates in are often chosen on the basis of credit decisions. Most of the trust and cooperation that is built between companies who do business jointly is based upon good credit ratings and prompt 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 down 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 most important element 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: 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 are there problems?

Once management gains an understanding of the company's receivables position and the trends that affect that state, they can take the next 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 into action the events that will execute and impose the credit policies of the corporation. The first main activity in this process 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 companies that are willing to extend them bigger lines of credit and longer payment terms than rivals. Credit investigation goes a long way to guarantee that this facility is only ever 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. Tey work with customers to organise product returns and issue credit memos for returned products; they also work with customers to manage disputes and clear up queries by issuing copies of contracts, purchase orders and invoices. The third main activity that performed is collections; a procedure that involves the ongoing maintenance of every customer's account status. Customers that have past-due accounts are contacted and payments are requested. Sometimes, new terms and schedules are negotiated for the payments outstanding.

Manage Credit Risk

Credit works by allowing the company to take intelligent and calculated risks that support its business plan. What may be an unwise credit decision from one viewpoint might be a good business decision from another perspective. If a business wants to expand its market share in a specifc area, it might make credit decisions that assist it to do so. Credit officers work with other people in the company to find new ways to lower the risk of selling to new types of customers. Payment terms that are attractive to consumers in these market segments can be devised. Credit risks can be decreased by the use of credit insurance, liens on customer assets and government loan guarantees for exports.

For primary customers and large individual sales, people in the credit area work with others in the business to structure special deals just for a single buyer. This increases the value that the business can offer to such a consumer and can be an important part of securing 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***