Managing Procurement Operations

Learning Outcomes

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

- ✓ Differentiate between Purchasing and Procurement
- ✓ Explore the Importance, Aims and Organization of Procurement.

Managing Procurement Operations

As we have previously discussed that preparation of a supply chain begins with strategic objectives, and moves down to systematize; the movement of materials, ensures that resources are obtainable, and frequently looks for enhanced methods. But we have still not discussed the method for initiating the movement of materials. This is given by **purchasing** or **procurement**.

In a supply chain, every business purchases materials from top of the list suppliers, adds value, and sells them to downstream consumers. As every business, in turn, buys and sells, the materials flow through the entire supply chain. The trigger that begins each move is a **purchase**. This is mainly a message that a business sends to a seller, saying, 'we have agreed on terms, so deliver us materials and we will pay you'. **PURCHASING** gives a system for initiating and regulating the flow of materials all over the supply chain.
Purchasing is the task accountable for acquiring all the materials requisite by an organisation. Many of the purchases transactions are not standard, but comprised of rental, contracting, leasing, gifts, exchange, borrowing, and so on. This is the reason why some people wish to talk regarding the 'achievement of materials' or the more common term of **procurement**. 'Procurement' and 'purchasing' are often referred to as the same thing. Usually, purchasing refers to the real buying, while procurement has wider meaning. It can consists of different kinds of acquisition (rental, purchasing, contracting, and so on) as well as the related work of selecting suppliers, agreeing terms, negotiating, expediting, monitoring supplier performance, materials handling, transport, warehousing and receiving goods from suppliers.

PROCUREMENT takes care of all the materials required by a business. It consists of all the associated activities required to get goods, services and any other materials from suppliers into a business.

Procurement does not generally move materials itself, but it arranges the transfer. It gives the message that materials are required, and organises the change of possession and location. But it is another function, like transport, that really delivers them. So procurement is mainly concerned with information processing, it gathers data from a range of sources, analyses it, and conveys information to the supply chain.

Importance of Procurement

You can simply see why procurement is vital. If we take a wider view, procurement forms a necessary connection between businesses in the supply chain, and it gives a system for coordinating the movement of materials between suppliers and consumers. At each point in the supply chain, procurement sends messages backwards to explain what customers desire, and it passes messages forwards to declare what suppliers have accessible. Then it negotiates conditions for delivery.
If we take a more limited view, procurement is clearly an essential function within every organisation. We know that each organisation requires some supply of materials, and procurement is responsible for organising this. If this function is carried out badly, materials do not arrive, or the wrong materials are

delivered, in the wrong quantities, at the wrong time, with pitiable quality, at too high price, low customer service, and so on.

Aims of Procurement

The overall objective of procurement is to assure that a business has a consistent supply of materials. With this superseding aim, we can widen the following list of more direct goals:

- organising a consistent and continuous flow of materials into a business
- working directly with user departments, establishing relationships and understanding their requirements
- finding good suppliers, working directly with them and developing beneficial relationships
- buying the correct materials and ensuring that they have satisfactory quality, arrive at the time and place required, and meet any other needs
- negotiating best prices and terms and conditions
- keeping stock low, considering stock policies, investment, readily available materials, and so on
- moving materials rapidly through the supply chain, expediting deliveries when essential
- Keeping abreast of conditions, including pending price increment, scarcities, new products, and so on.

Organisation of Procurement

The way that procurement is controlled clearly depends on the kind and size of the business. In a small organisation, a single consumer might be accountable for all purchases, policy and supervision. A medium-sized organisation might have a department with buyers, storekeepers, expeditors, and clerks. A big company might have hundreds of people co-ordinating large amounts of purchases.
Usually procurement is arranged as a single division to get the advantages of **centralised purchasing**. These benefits include:

- Consolidation of all orders for the same, and alike, materials to acquire quantity discounts
- co-ordinating related activities to decrease costs of transport, stockholding and administration
- eliminating duplicated effort and messy practices
- having a single point of contact for vendors and giving them reliable information and service
- developing focused skills and enhancing procurement operations
- Allowing other people to focus on their own work without indulging into purchasing
- Concentrating liability for procurement, making management organization easier.

Choosing Suppliers

Qualified Suppliers

Arguably, the most significant element of procurement is searching and choosing the right supplier. There is no point in having an elegant product, if the supplier cannot in point of fact deliver it. Suppose you are working on a plan and want to purchase some significant materials – maybe a prefabricated bridge for a building project. You will consider two factors. First, a product design that meets your needs, second, a seller who can promise to deliver the product as designed. In other words, the seller must be able of doing the work, giving high quality, working to a timetable, with satisfactory costs, and so on. An advertised time of four hours for a train journey may appear a good service, but it has less worth if the train operator cannot really deliver this.

Procurement begins by finding a **capable supplier**. This is one who can in fact deliver the materials required. In general, organisations search for suppliers who:

- are financially safe with good long-standing prospects
- have the aptitude and competence to supply the essential materials
- precisely deliver the requested materials
- send materials of certain high quality
- deliver reliably, on time with little lead times
- quote satisfactory prices and financing arrangements
- are flexible to customers' demands and changes
- are knowledgeable and have skill in their products
- have earned an excellent reputation
- use expedient and simple procurement systems
- have been used effectively in the past and can expand long-term relationships.

In diverse circumstances, a lot of other factors may be significant, like convenient location, skill to deal with variable demand, and so on.

Most organisations contains list of officially approved suppliers who have given good service in the past, or who are otherwise known to be trustworthy. If there is no satisfactory supplier on file, the organisation has to search for one. Suppliers for low worth items can perhaps be found in trade journals, catalogues or through business contacts. More costly items need a careful search, and this can be very time taking. A helpful approach for deciding the best supplier for a product has the following steps:

- Look for alternative suppliers
- Build a long list of qualified suppliers who can deliver the products
- Compare organisations on this long list and eliminate those who are, for any reason, less desirable
- Continue eliminating organisations until you have a shortlist (usually four or five) of the most promising suppliers

- Prepare an enquiry, or request for quotation, and send it to the shortlist
- Receive bids from the shortlist
- Do a preliminary evaluation of bids and eliminate those with major problems
- Do a technical evaluation to see if the products meet all specifications
- Do a commercial evaluation to compare the costs and other conditions
- Arrange a pre-award meeting to discuss bids with the remaining suppliers
- Discuss condition bids, which are specific conditions that have to be agreed
- Choose the supplier that is most likely to win the order
- Arrange a pre-commitment meeting to sort out any last minute details
- Award orders to the preferred supplier.

This is clearly a time-consuming procedure, but keep in mind that a poor merchant can cause more issues than poor materials. The whole process is only utilized for main purchases, and if you are purchasing pencils the shop next door is possibly as good as any other supplier. Normally, a business will spend not much time looking at substitute suppliers if:

- It is purchasing to value materials
- There is just one supplier available
- There is already a successful arrangement with a merchant
- There is not sufficient time for extensive negotiations
- The business has a strategy of selecting particular sorts of supplier.

Sometimes, mainly with government work, procurement has to be clearly fair, and all prospective suppliers must be provided with a chance to give quotations. Rather than making a shortlist of capable suppliers, a business will broadly promote that it is seeking quotations for particular materials or work. The organisation evaluates all the bids submitted and selects the one that best fulfils the approved criteria. This is called **open tender**. A difference reduces the managerial effort by putting some qualifications on suppliers, maybe based on experience, financial status or size. This gives **limited tender**. As you can see, we are discussing about consumers selecting suppliers – and suppose that suppliers are pleased to serve all the consumers they can discover. This is generally the case, but often suppliers have more authority and efficiently select their customers. This might occur when a supplier enjoys monopoly, or near monopoly, of some material. It may also occur when there is a short-term shortage of some product, such as oil, and suppliers select the customers they will supply, maybe giving first choice to larger consumers, those who pay more, or those who have long-standing agreements.

Number of Suppliers

We have already talked about the trend towards enduring partnerships and alliances. This unavoidably moves businesses towards single suppliers, either for every material, or for a range of diverse materials. Some organisations labels it as **single sourcing** that leaves them susceptible to the performance of an individual business, and they have harsh problems if something bad happens. If the single seller of a vital part hits financial problems, an organisation though no fault of its own, might have to discontinue production. To neglect this, some organizations have a strategy of buying the same materials from more than one competing suppliers. They may use rules of thumb such as 'never let a producer account for more than 20% of whole revenue; never let a consumer suck up more than 50% of total resources'. The selection must depend on individual circumstances, but we can have some benefits of policy:

Benefits of single sourcing:

- A stronger connection between consumers and suppliers, often happened to be in alliances or partnerships
- Dedication of all parties to the accomplishment of the relationship
- Economies of scale and cost discounts with big orders
- Easier communication, decreased administration and simpler processes for standard orders
- Less difference in materials and their supply
- Easier to maintain requirements, conditions and so on, secret.

Benefits of multi-sourcing:

- Competition between suppliers decreases prices
- There is less possibility of disrupted supplies, as issues can be avoided by changing suppliers
- Can deal more simply with changing demands
- involving more businesses can provide access to broader information and knowledge
- is more probable to cheer innovation and development
- does not rely on trusting single organisation.

Organizations' utilize more sellers when they want to keep away from potential problems. Another way of doing this is the approach called **forward buying**. In its simplest form, this occurs when a business orders more materials than it presently needs and keeps the surplus in stock.
Another form utilizes contracts to bring materials at particular points in the future. Both of these carry two benefits. First, they assure supplies for some period in the future and reduce the effect of potential disruptions. Second, the cost of materials is fixed, avoiding the impacts of future price increases or ambiguity. Of course, things can still go erroneous. A company that signs a lasting contract can still go out of business, or a storehouse can burn down, but the chances of a crisis are much smaller. It is perhaps safest for the business to hold spare stock itself, but this has higher costs; agreeing a contract for upcoming deliveries gives lower costs, but does not abolish so much risk.

Monitoring Supplier Performance

Most organisations examine their suppliers to ensure that they carry on giving satisfactory service. This is called **supplier rating** or **vendor rating**. This is usually done casually by a skewed review; sometimes there are multifaceted measures for each feature of performance. Most organisations employ a negotiation that gives a sensible view of performance, and requires a rational amount of effort. One general approach utilizes a checklist of significant factors and checks that the supplier meets a suitable standard in these. The checklist may ask whether the supplier is economically sound; whether it supplies on time; if material value is high enough; if there is practical support; whether the cost is competitive; about related trends, and so on.

If the supplier does not meet any principle the consumer has to examine improvements or look for new sources. The objective is not truly to substitute particular suppliers, but to check performance, recognize areas that require improving and agree the most excellent way of getting these improvements. Only as a last option should a business start looking for new suppliers.

A more practical approach to score gives the seller a score for diverse aspects of performance. They may, for instance, give each supplier a score out of ten for on-time delivery, and if a supplier's score drifts down below eight the consumer can consider ways of improving performance. Although this method sounds believable, there can have substantial difficulties. How, for instance, can you recognize the most significant factors of supplier performance, the comparative value of each, the actual performance, and the lowest tolerable performance? Each of these is likely to come from a blend of agreement and discussion, rather than from more accurate measurement. The result is a skewed view that might be useful, but contains little objective measurement.

Procurement Cycle

Steps in the Cycle

After selecting the supplier the business has to follow some process for arranging purchases. Suppose that you want to purchase something costly, like a new computer. You possibly approach this in quite a lot of stages, listing the features you want, searching for systems that may provide these, searching suppliers, developing a list of options, comparing these, and opting for the best. Your objective is to discover the blend of products and suppliers that best caters your needs. The procurement function in a business does exactly the same, and follows a particular process for every purchase. This process is diverse in each organisation, and varies with the kind of thing being bought. You would not anticipate an organisation such as the US army, which purchases millions of items a day, to work in the similar way as the directors of Real Madrid football club when they obtain a new striker. And the US army would not approach its decision to purchase pencils in the same way as its decision to purchase helicopters.

Despite these expected differences in detail, we can propose a common approach to procurement. This has a chain of common steps, which begin with a user searching a need for materials and end when the supplies are delivered. A distinctive **procurement cycle** has the following steps (with key documents in bold).

1. ***A user department:***
   - Finds out a need for acquired materials

- Examines materials accessible and prepares specifications
- Checks departmental financial plans and gets clearance to procure
- Prepares and transmits a purchase request to department of procurement.

2. ***Then procurement:***
   - Obtain, verify and verify the purchase request
   - Inspect the material requested, looking at existing stocks, substitute products, production options, and so on – and after negotiations with the user department make a shortlist of possible suppliers, from standard suppliers, lists of favoured suppliers, or those known to cater requirements
   - Send a request for quotations to this shortlist.

3. ***Then every supplier:***
   - Examines the demand for quotations
   - Checks the customer's rank, credit, and so on
   - Sees how it could best cater the order
   - Sends a quotation back to the business, giving details of prices, products, and conditions.

4. ***Then procurement:***
   - Examine the quotations and do commercial evaluations
   - Discuss technical aspects with the user department
   - Check budget details and clearance to purchase
   - Choose the best supplier, based on the details supplied
   - Discuss, consult and confirm terms and conditions with the seller
   - Issue a purchase order for the materials (with terms and conditions attached).

5. ***Then the selected supplier:***
   - Receives, recognizes and processes the buying order
   - Organises all operations essential to provide the materials
   - Ships materials jointly with a shipping advice
   - Sends an invoice.

6. ***Then procurement:***
   - Acknowledge receipt
   - Do any essential follow-up and expediting
   - Receive, examine and accept the materials
   - Inform the user department of materials received.

7. ***Then the user department:***
   - Receives and inspects the materials
   - Authorises shifts from budgets
   - Updates stock records
   - Uses the materials as required.

8. ***Then procurement:***
   - Arrange payment of the supplier's invoice.
   - The first three steps are more concerned with the supplier and materials, and then comes the critical point with the topic of a procure order in step 4. At this stage the organisation is willing to buy particular materials from a supplier, and the buying order triggers the supply (along with essential production planning, transport arrangements, finance, and so on). The purchase order is an element of a legal agreement between the supplier and its organization. The remaining steps conclude the details of delivery.
   - This process seems complicated, and consists of a lot of steps and documents. If you are buying something costly, this effort is definitely worthwhile – and you might in fact follow a much more complex procedure to fix product specifications, choose the supplier and discuss terms. But if you are making little purchases, if there are present relationships with suppliers, or there is just one competent supplier, it is obviously not worth going through this entire expensive, procedure.
   - Some of the issues with paper-based procurement are:
   - Consume much time to go through the entire procedure
   - Relying on various and paperwork which shift around diverse locations
   - Needing so many to complete, examine, process, hoard and generally deal with all the paper
   - Having other people to administer manage and organize the managerial procedures
   - Inevitable errors may arise because of too many documents and people involved
   - Not giving notice to linked systems like stock control.

A main step in developing procurement came with electronic buying. Electronic data interchange (EDI) has been utilized since the 1980s, and this permits a mechanical procurement. A business links its information system to a vendor's, and when it is time to put an order the system mechanically conveys a message. This works fine for small, normal, repeat orders and most businesses gladly adopted the principles. There are some variations on automatic procurement, all of which are measured under the broad heading of **e-procurement**.

E-Procurement

Most organisations are currently utilizing some type of e-procurement. Surveys propose that more than 60% of UK companies exploited e-procurement till 2002, and 80% of European managers soon be expecting to use it far. Some of the benefits this brings are:

- Allowing immediate access to vendors anywhere in the world
- Creating a clear market where goods and terms are readily accessible
- Automating procurement with benchmark procedures
- Greatly dropping the time required for transactions
- Reducing costs, usually by 12–15%7,8
- Contracting out some procurement activities to vendors or third parties
- Integrating flawlessly with suppliers' information systems

There are essentially two kinds of e-procurement which are explained as B2B (where one company buys materials from another company and B2C (when an end customer buys from a business). Most of the people are more familiar with B2C transactions. Between 1999 and 2002 the number of Internet shoppers in the UK increased from 2 million to 6 million.9 Nonetheless, many of those websites have hit monetary troubles with the bursting of the 'dot-com bubble', and there have been a number of extensively publicised bankruptcies.
One difficulty, of course, is that people do not essentially like e-procurement. If you desire to purchase a book, you can employ a variety of websites, fill in the forms for your buy, and get the book delivered within a day. But if you go to your nearby bookshop, you may use less stylish technology, but pick up the book right away and with no the delivery charge. B2C can hit difficulties since people in fact like going to look at things previous to they purchase.

Types of Purchase

Different approaches for different products
When we explained a formal process for procurement, we said that it can be extremely complex and time consuming. It would be costly and needlessly complicated to make use of this process for each purchase, and nobody wants to waste six months buying a pack of envelopes. On the other hand, main purchases require much more information and examination.
This is why organisations change the details of their procurement dealings, matching the types and methods of materials. Normally speaking, the higher the cost of materials and the more complex the requirements, the more time and exertion procurement needs.
Organisations often put rules for the effort put into procurement, maybe using ad hoc actions for low-value routine supplies, an easy, automatic method for purchases up to £20,000, a more precise process for purchases up to £150,000, and unique, comprehensive analysis for greater purchases.
Once such rules are defined, a management control system can check purchases and ensure that they are completed in the best way. It can review how purchases have been made, if the result is acceptable, if the effort is practical in relation to the costs and significance, and if the process can be enhanced for

the future. A significant point here is the difference between schedule, repeat orders and new ones. If a seller has given good service over some extensive time, a business may be prevented from approximately all the procurement cycle and put negligible effort into administering potential orders. Ordering turns out to be routine and the organisation successfully sends a message to say, 'send another order like the last one'. With non-routine buying, an organisation has to be more cautious and put more effort into the choice of supplier, and situations of purchase.

If an order is repeated often enough, a business might consider the 'make-or-buy' decision. In other words, it has to choose those materials that it can manufacture itself and those that are best met by outside suppliers. In its simplest form, this asks whether a company can get materials more inexpensively from a supplier than it can make them. Well-organized strategies and economies of scale often mean that particular suppliers can carry materials at lower prices than other businesses can make them. There are, although, a lot of other factors to consider. Making parts internally can be more reliable, give greater control over supply, modify products, have shorter lead times, use spare resources, protect designs, keep value-adding operations, boost the size of business, and so on. On the other hand, buying them from sellers can get the advantages of specialisation, give access to better expertise, get economies of scale, decrease stock levels, transport some risk, preserve flexibility, and so on.

The Department of Trade and Industry implies that the three major criteria for these decisions are:

- Financial factors – related to costs
- Operational factors –related to responsiveness, reliability, flexibility, and so on
- Strategic factors – related to the lasting consequences of the decision for the business

In practice, the apparent benefits of outsourcing are rising and more organisations are contented to focus on their core functions and use particular suppliers for materials.

Terms and Conditions

Though we have talked in broader terms regarding 'placing an order', there are numerous different types of order. Organisations usually talk about 'placing an order' for supplies, but 'signing a contract' for services and 'leasing' equipment. To a great extent, these are diverse ways of saying the same things, but there might be lawful differences.

We have already described some particular types of order, with the following being most general:

- Purchase orders are utilized in the standard manner for procurement that we described above.
- It is fundamentally a letter from one business to another, giving information of the materials it desires to acquire and its conditions of buying. This is generally a reaction to a quotation from a capable supplier, giving the materials it can provide and its conditions of trade.
- Blanket orders offer a simple system for inexpensive standard items, such as stationery. A business can put a single order for all the goods that it will require over some period, such as a year. Then the seller delivers batches of products when requested during the year.

- e-Procurement uses EDI or the Internet to simplify purchases by replacing paper-based procedures with electronic ones. This gives a fast and efficient method for repeat, or straightforward, orders.
- Contracts give careful descriptions of a contract between a business and a supplier; they explain precisely the responsibilities, work and services for each, jointly with all applicable terms and conditions. A lot of organisations make use of contracts regardless of purchase orders for comprehensive services, so they sign a contract for a supply of electricity. In the similar way, businesses can sign a contract for a particular piece of work, like a construction business building a length of road.
- Sub-contracts: when a seller signs a contract with the business, it might not do all the work itself, but would like to assign some work to a sub-contractor. Then, there are two contracts– the contract between the business and the supplier, and the subcontract between the supplier and sub-contractor. For large projects, there can be some more layers of sub-contracting.
- Leases and rental agreements are again there to portray terms and conditions of getting materials. They are usually used for buildings or apparatus that is returned to the possessor after some period of utilization. You can rent or lease a car, for instance, and when you have finished with it, you return it to the owner.

Pricing is a very complex issue. It is surely not in an organisation's long-standing interest to force suppliers to offer idealistically low prices, or they will go out of business and not be there next time they are required. Supermarkets in parts of the European Union have followed customer pressure to decrease food prices. While this benefits their consumers – and most probably the broad population – it means paying less to farmers who cultivate the crops. If farmers go out of business, there is a main impact on rural communities and the countryside, more dependence on imported food, a consequence on the balance of trade, and so on. In general, there are four means of setting a price for materials:

- Price lists – where sellers quote fixed prices. Book publishers, for instance, quote a selling price that they anticipate retailers to utilize. They can offer discounts for large or unique purchases, but one business basically fixes the price.
- Special quotation – where suppliers quote prices to every customer, mainly for nonstandard materials. Customers submit a quotation request, and the supplier returns a price and conditions that it is ready to offer.
- Negotiation – when there is some flexibility in price and conditions. A seller might give a quote, but is ready to discuss if it can get some advantage such as repeat orders. Similarly, consumers can negotiate if they want special conditions, like fast delivery.
- Commodity pricing – for commodities like oil, coffee, gold and wheat, market forces decide the going rate that is followed by all suppliers. You can observe lots of such figures in, say, financial futures markets.

A number of standard conditions are utilized and for chronological reasons they appear to be phrased in terms of shipping:

Ex-works: The customer accepts materials 'at the factory gate' and takes over all liability for transport, documents, customs authorization, insurance, risk and so on. This kind of contract is best when the seller has little experience of shifting materials through the related area, or the buyer has a lot of experience. If neither has the essential experience, they can sub-contract the real movement to third party specialists.

- Free alongside (FAS): Here the supplier moves materials to a specified 'port' and delivers them 'alongside a ship'. The customer takes over the loading on a vessel and movement onward.
- Free on board (FOB): This is a variation of FAS, where the seller also takes care of the loading onto the vessel, and then the consumer is accountable for onward transport. This may seem like a small adjustment to FAS, but loading may involve heavy lifts, danger of damage, or use of lighters.
- Delivered ex-ship: Where the goods are obtainable on the ship (or quayside) but the consumer has to organize for customs authorization, duty, and so on.
- Cost and freight (C&F): Here the merchant arranges transportation to an agreed point, but the consumer accepts any danger and arranges insurance for the voyage.
- Cost, indemnity and freight (CIF): Where the seller delivers to an agreed point, and also arranges insurance for the journey.
- Delivered: Where the seller is accountable for all aspects of the transport up to delivery to the consumer.

Manufacturing

A considerable number of firms in the supply chain are engaged in manufacturing products. Whereas about all business firms are involved in procurement and market distribution operations, manufacturers add value by converting raw materials into customer or industrial products. They make value by producing and marketing product/service bundles to either end consumers or middle members of the supply chain.

Manufacturing Perspectives

The range of products a business makes evolves from its technical ability and marketing strategy. Firms' ideal manufacturing competencies are based upon market opportunity and readiness to take ground-breaking risk. While the products formed are clearly diverse, the genuine differentiator between firms is taken in competencies correlated to knowledge, technology, procedure, and strategy. Once established, a manufacturing business's image and focus are constantly customized in the eyes of supply chain partners as it conducts trade, researches and develops new products, and performs agreed-to value-added services.

A firm's manufacturing capability is based on:

- **Brand power**
- **Volume**
- **Variety**
- **Constraints**
- **Lead-time requirements**

Brand Power

A lot of manufacturers use a great deal of promotional cash to create brand consciousness and approval among potential buyers; as a result, they are usually identified by their product brands. The evaluation of a customer's buying preference based on a manufacturer's status, product quality, and supply chain abilities is known as brand power.

As a common rule, the ***stronger a firm's product brand image among buyers, the more leverage the manufacturing organization will have in determining supply chain structure and strategy.*** For example, Deere & Company dominates how farm machinery, as well as lawn and garden products, are sold, distributed, and maintained.

It is general practice for a business to subcontract some or even all manufacturing and logistics operations necessary to market a particular product. The nature of the production procedure, cost, and next target in the supply chain go a long way to find out the prettiness of outsourcing. Logistical needs in terms of inbound materials and finished product allocation are created by the geological relationship between places of manufacturing operations and those of traders and customers.

Volume

Manufacturing processes are categorized in terms of the association of cost per unit to volume of output. The conventional standpoint is to treat volume in terms of the well established standard of **economy of scale.** The scale principle describes a connection wherein the standard cost of producing a manufactured goods declines as its manufacturing size increases; that is, a product quantity must be increased as long as a per unit boosts in volume decreases the average cost per unit manufactured. Economy of scale arises from efficiencies generated by specialization of procedure, labour force, fixed asset consumption, procurement economies, and restricted need for procedure changeover.

Economy of scale is extremely important in manufacturing conditions involving high fixed cost machines to change raw material into completed products.

In volume-sensitive industries, elevated capital outlay coupled with high price of changeover tends to cheer enormously long production runs. In terms of logistic, two considerations associated to volume manipulate supply chain design. First, supply chain operations must lodge the number of times a particular product is manufactured during a particular planning period. Such ***manufacturing frequency*** has a straight impact on both inbound and outbound logistical needs. Second, the amount or lot size usually produced during a particular manufacturing run determines the product level that must be handled and warehoused in a supply chain structure.

Variety

In difference to manufacturing situations subjugated by scale, other production technologies mark flexibility. These manufacturing procedures are characterized by comparatively frequent product runs and high repetition of small lot sizes. As contrasted to economy of scale, industrialized processes that mark variety fast switch production from one product to another while retaining competence are referred to as having **economy of scope.**

Variety means the ***range*** of product variations that are able of being produced in a given manufacturing procedure. Such difference might result from the nature of how products are routed all through a modern plant and/or the use of general as contrasted to specialized equipment. The attainment of economy of scope is also openly related to the speediness and cost of changeover from one product to another.

Constraints

All manufacturing procedures replicate a balance between economy of scale and economy of scope. Volume and variety force for logistical support requirements. Constraints interrelate with volume and diversity to make manufacturing plans. The three main constraints that control manufacturing operations are:

- ***Capacity***
- ***Equipment***
- ***Setup/ changeover***

- **Capacity** is the measure of quantity of a particular product can be produced per unit of time. Of particular attention is a firm's ***demonstrated*** ability of quality production. While a factory, process, or mechanism might have a ***rated*** capability, the related measure is a firm's verified ability to attain and sustain a particular level of quality output in an expected time period. A measure of production capability is the swiftness to which a particular procedure reaches confirmed capacity given an unanticipated change in requirements.
- **Equipment** constraints are associated to flexibility regarding the utilization and sequencing of particular machines to carry out numerous manufacturing tasks. Clearly the assortment a factory can make is constrained by the range of obtainable equipment and the necessary sequence of work. Though, some manufacturing requirements are more simply accommodated across a machines' family and by using changeable work sequences than are others. In lots of situations, a particular machine or work task tends to limit or act as a bottleneck to the overall manufacturing procedure. The structure for emphasizing managerial notice is captured in ***theory of constraint*** method.
- **Setup changeover** constraints are in a straight line connected to the earlier discussion regarding variety. Substantial growth has been made in manufacturing administration to speed up both procedure changeover time and the time needed to reach confirmed capacity.

Leadtime

Manufacturing **leadtime** is a gauge of the elapsed time between release of a work order to the shop floor and the achievement of all work needed to attain ready-to ship product status. Any given manufacturing procedure utilizes functioning and interoperational time.

Operational time is the blend of setup changeover and running or genuine production time. In any manufacturing situation the greater the quantity of total lead-time accounted for by real production, the intrinsically more efficient is the conversion process. Efficient functioning time must be traded off against the issues discussed formerly about volume and diversity.

Manufacturing processes also come across unforeseen losses of time. Production efficiency is negatively affected during those periods when a procedure, line, or mechanism is idle because of queuing, breakdown, waiting or stoppage in logistical support,. All forms of unanticipated delay represent severe bottleneck issues.

Logistical operations dedicated to supporting production can force operating efficiency in a diversity of ways. The possible benefits of brand power are based on a firm's track record concerning timely performance of consumer order-to-delivery dedication. Lot-size efficiencies related to production frequency and recurrence are reliant on dependable logistical support. The choice to manufacture big manufacturing lot sizes straight creates requirement for logistical support.

Manufacturing Strategy

The exclusive nature of every manufacturing procedure and the market served limits the sensible range of different strategies. Manufacturing strategic scope is constrained by both promotion and technological forces.

For example, a producer having a method dominated by economy of scale might desire to develop process flexibility. Though, an important investment will normally be necessary to boost frequency and recurrence.

With time, the varying nature of the market and obtainable technology serve to change a firm's current strategic posture.

Matching Manufacturing Strategy to Market Requirements

Mass marketing needs inadequate product/service differentiation. In contrast, one-on-one promotion strategy builds on exceptional or tailored product/service offerings for every consumer. The strategic marketing attitude of a firm in terms of flexibility and dexterity to lodge particular consumer requirements is directly connected to manufacturing capability. To a large degree, a firm's manufacturing ability drives the possible range of efficient marketing strategy. For a manufacturing business to efficiently compete, it must be able to incorporate manufacturing ability into a significant marketing value proposition.

Strategic Alternatives

The most ordinary manufacturing strategies are **make-to-plan (MTP), make-to order (MTO),** and **assemble-to-order (ATO).** It is also widespread to refer to MTP as **make-to-stock (MTS).**

As a common rule, MTP strategies are trait of industries exploiting economy of scale that arises from long production runs. Important finished goods inventory is normally manufactured in expectation of future consumer requirements. The logistical necessities to support MTP are warehousing ability to accumulate finished product and to assist product variety for particular customers. When flexible manufacturing is launched to speed up change over, the inventory lots formed are normally smaller in size. However, warehouses are still necessary for short-term storage and to assist product variety.
In comparison, MTO manufacturing strategies look for manufacturing to customer requirement.
While MTO might not be as imperfect as the conventional job shop, precise quantities and configurations are shaped in comparatively small quantities. Logistical ability might be required for provisional storage and to attain outbound transportation consolidation, however most product produced in MTO surroundings is shipped straight to customers.

Total Cost of Manufacturing

The marketing and industrialized strategies of a firm force logistical service requirements. For instance, MTO manufacturing strategies usually require less finished goods inventory than MTP and AT0 strategies. However, MTO strategies naturally require constituent inventory support and might result in high-cost market allocation. In light of such cost trade-offs, the design of a logistics support system should be based on the **Total Cost of Manufacturing (TCM).**

Logistical Interfaces

The well-organized and successful coordination of manufacturing policy with the procurement of components and materials eventually relies on logistics. Resource inputs should be procured and made accessible when required for manufacturing operations. Whether the manufacturing scheme is MTO, ATO, or MTP, logistics links the seller base with manufacturing processes.
The better the prospect is for attaining lowest cost of possession and, eventually, lowest total cost of manufacturing. Such operations merely appear when there is high-level supplier combination in both operations and in design. Just-in-Time, Materials Requirements Planning, and Design for Logistics represent three approaches to achieving desired coordination.
Just-in-Time (JIT) techniques have got considerable notice and debate in recent years in each functional area linked to supply chain management. Sometimes termed as just-in-time production, often called just-in-time purchasing, and normally referred to as just-in-time delivery, the objective of JIT is to time-phase activities so that materials and components bought land at the manufacturing or congregation point just at the time they are needed for the transformation procedure.
Requirements can be dogged by focusing on the completed product being made. Once the production agenda is established, just-in-time entrance of components and materials can be designed to agree with those needs, resulting in decreased handling and negligible inventories. The implications of J1T are many. Obviously, it is essential to deal with sellers who have high and steady levels of quality, as their components will go straight into the finished product. Absolutely steady logistical performance is essential and abolishes, or at least decreases the necessity for cushion stocks of materials. J1T typically

requires more regular deliveries of lesser quantities of purchased inputs, which might necessitate alteration of inbound transportation.
Originally, JTT was implemented to manufacturing procedures characterized as MTP, since the efficient functioning of the system is reliant upon a finalized production timetable.
Some organizations, viewing the advantages of JIT systems and recognizing the benefits of supplier amalgamation, have gone so far as to carry their suppliers' personnel into their manufacturing plants. The seller personnel are allowed to use the customer's purchase orders, have complete access to construction schedules, and have liability for scheduling influx of materials.

Requirements Planning

In multifaceted manufacturing organizations a procedure termed as **Materials Requirements Planning (MRP)** is regularly used to help in the edge between purchaser and seller. MRP systems try to expand benefits similar to those of JIT, reduce inventory, preserve high consumption of manufacturing capacity, and organize delivery with procurement and developed activities. Execution of MRP systems needs a high level of technical sophistication. Software applications like superior planning and scheduling systems have been developed to deal with the complication of information essential, such as lead-times, quantities on-hand and on-order, and mechanism capacities for factually thousands of materials across manifold manufacturing locations.

Design for Logistics

The logistics border with procurement and manufacturing, as well as with engineering and advertising, can be really enhanced by incorporating a notion known as **Design For Logistics** into the early stages of product development. Recall that the aims of JIT and MRP are to reduce inventories and handling, with materials and machinery being prepared for assembly or alteration as they are required.

Further Reading:

- ✓ ***Purchasing and Supply Chain Management By Kenneth Lysons, Brian Farrington***
- ✓ ***Operations Management and Productivity Techniques, (2009) By T. T. KACHWALA, P. .N. MUKHERJEE***
- ✓ ***Logistics Operations and Management: Concepts and Models, (2011) edited by Reza Farahani, Shabnam Rezapour, Laleh Kardar***