

LESSON 7

PLANT LOCATION AND LAYOUT

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STRUCTURE

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7.0 INTRODUCTION

In the previous unit you have learnt how the entrepreneur conducts the detailed analysis comprising of technical, financial, economic and market study before laying down a comprehensive business plan. For implementation of this plan, he has to take various crucial decisions namely location of business, layout (the arrangement of physical facilities), designing the product, production planning and control and maintaining good quality of product. This lesson deals with various aspects of plant location and layout. Investment in analyzing the aspects of plant location and the appropriate plant layout can help an entrepreneur achieve economic efficiencies in business operations. These decisions lay the foundation of the business of small entrepreneurs.

7.1 OBJECTIVES

After studying this lesson, you should be able to:

- Describe the concepts of plant location and plant layout
- Identify the various factors to be considered for selection of plant location- from state/area to the specific site
- Distinguish among the alternative patterns of plant layout
- Discuss the various factors influencing the choice of an initial layout and its subsequent modification

7.2 PLANT LOCATION

Every entrepreneur is faced with the problem of deciding the best site for location of his plant or factory.

What is plant location?

Plant location refers to the choice of region and the selection of a particular site for setting up a business or factory.

But the choice is made only after considering cost and benefits of different alternative sites. It is a strategic decision that cannot be changed once taken. If at all changed only at considerable loss, the location should be selected as per its own requirements and circumstances. Each individual plant is a case in itself. Businessman should try to make an attempt for optimum or ideal location.

What is an ideal location?

An ideal location is one where the cost of the product is kept to minimum, with a large market share, the least risk and the maximum social gain. It is the place of maximum net advantage or which gives lowest unit cost of production and distribution. For achieving this objective, small-scale entrepreneur can make use of locational analysis for this purpose.

7.2.1 LOCATIONAL ANALYSIS

Locational analysis is a dynamic process where entrepreneur analyses and compares the appropriateness or otherwise of alternative sites with the aim of selecting the best site for a given enterprise. It consists the following:

(a) Demographic Analysis: It involves study of population in the area in terms of total population (in no.), age composition, per capita income, educational level, occupational structure etc.

(b) Trade Area Analysis: It is an analysis of the geographic area that provides continued clientele to the firm. He would also see the feasibility of accessing the trade area from alternative sites.

(c) Competitive Analysis: It helps to judge the nature, location, size and quality of competition in a given trade area.

(d) Traffic analysis: To have a rough idea about the number of potential customers passing by the proposed site during the working hours of the shop, the traffic analysis aims at judging the alternative sites in terms of pedestrian and vehicular traffic passing a site.

(e) Site economics: Alternative sites are evaluated in terms of establishment costs and operational costs under this. Costs of establishment is basically cost incurred for permanent physical facilities but operational costs are incurred for running business on day to day basis, they are also called as running costs.

Two sites A and B are evaluated in terms of above mentioned two costs as follows:

Table 7.1: Comparative Costs of Alternative Locations

Costs	Site A (Rs.)	Site B (Rs.)
<i>Cost of establishments:</i>		
Land and Buildings	350000	230000
Equipment	60000	60000
Transport facilities	20000	30000
<i>Cost of operations:</i>		
Materials, freight and carriage	34000	24000
Taxes and insurance	10000	7500
Labour	100000	70000
Water, power and fuel	10000	8000
Total	584000	429500

The above cost statement indicates that site B is preferable to site A keeping in mind economic considerations only although in some respects site A has lower costs. By applying the definition of ideal location which is the place of maximum

net advantage or which gives lowest unit cost of production and distribution, site B would be preferred.

7.2.2 SELECTION CRITERIA

The important considerations for selecting a suitable location are given as follows:

- a) Natural or climatic conditions.
- b) Availability and nearness to the sources of raw material.
- c) Transport costs-in obtaining raw material and also distribution or marketing finished products to the ultimate users.
- d) Access to market: small businesses in retail or wholesale or services should be located within the vicinity of densely populated areas.
- e) Availability of Infrastructural facilities such as developed industrial sheds or sites, link roads, nearness to railway stations, airports or sea ports, availability of electricity, water, public utilities, civil amenities and means of communication are important, especially for small scale businesses.
- f) Availability of skilled and non-skilled labour and technically qualified and trained managers.
- g) Banking and financial institutions are located nearby.
- h) Locations with links: to develop industrial areas or business centers result in savings and cost reductions in transport overheads, miscellaneous expenses.
- i) Strategic considerations of safety and security should be given due importance.
- j) Government influences: Both positive and negative incentives to motivate an entrepreneur to choose a particular location are made available. Positive includes cheap overhead facilities like electricity, banking transport, tax relief, subsidies and liberalization. Negative incentives are in form of restrictions for setting up industries in urban areas for reasons of pollution control and decentralization of industries.
- k) Residence of small business entrepreneurs want to set up nearby their homelands

One study of locational considerations from small-scale units revealed that the native place or homelands of the entrepreneur was the most important factor. Heavy preference to homeland suggests that small-scale enterprise is not freely mobile. Low preference for Government incentives suggests that concessions and incentives cannot compensate for poor infrastructure.

Table given below also suggests that the locational choice undergo change with differences in the levels of development across the regions (hills and plains).

Table 7.2: Factors Affecting Location Decision

Considerations	Entrepreneur's Response					
	Hills		Plains		Total	
	No.	%	No.	%	No.	%
Homeland	15	67	11	39	26	52
Government Incentives	3	14	1	4	4	8
Availability of Raw material	0	0	1	4	1	2
Availability of labour	2	9	0	0	2	4
Availability of market	0	0	5	18	5	10
Availability of infrastructure Facilities	1	5	9	32	10	20
Others	1	5	1	4	2	4
Total	22	100	28	100	50	100

7.2.3 SIGNIFICANCE

From the discussion above, we have already learnt that location of a plant is an important entrepreneurial decision because it influences the cost of production and distribution to a great extent. In some cases, you will find that location may contribute to even 10% of cost of manufacturing and marketing. Therefore, an appropriate location is essential to the efficient and economical working of a plant. A firm may fail due to bad location or its growth and efficiency may be restricted.

CHECK YOUR PROGRESS

1. The factor least important to consider when selecting a location for a new furniture store is
 - a. The weather of the community
 - b. The future of the community
 - c. The other businesses in the community
 - d. The age distribution of the population in the community
2. When selecting a site for a business it is important to
 - a. Purchase the property when possible

- b. Lease the property to avoid the problem of mortgage payments
 - c. Rent or buy the property, whichever must be done in order to obtain the specific site
 - d. Make comparisons between the rentals of neighboring stores and property for sale
3. After going through the above section, choose any five key words and explain their meaning in your own words
- a.....
 -
 - b.....
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 - c.....
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 - d.....
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 - e.....
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ACTIVITY

Talk to three entrepreneurs, one in manufacturing, one in trade and one in service business. Discuss with them to find out:

- (a) The factors considered by them in the location decision.
- (b) How have availability of transportation and labour affected their location decision?

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7.3 PLANT LAYOUT

The efficiency of production depends on how well the various machines; production facilities and employee’s amenities are located in a plant. Only the properly laid out plant can ensure the smooth and rapid movement of material, from the raw material stage to the end product stage. Plant layout encompasses new layout as well as improvement in the existing layout.

It may be defined as a technique of locating machines, processes and plant services within the factory so as to achieve the right quantity and quality of output at the lowest possible cost of manufacturing. It involves a judicious arrangement of production facilities so that workflow is direct.

7.3.1 DEFINITION

A plant layout can be defined as follows:

Plant layout refers to the arrangement of physical facilities such as machinery, equipment, furniture etc. with in the factory building in such a manner so as to have quickest flow of material at the lowest cost and with the least amount of handling in processing the product from the receipt of material to the shipment of the finished product.

According to Riggs, “the overall objective of plant layout is to design a physical arrangement that most economically meets the required output – quantity and quality.”

According to J. L. Zundi, “Plant layout ideally involves allocation of space and arrangement of equipment in such a manner that overall operating costs are minimized.

7.3.2 IMPORTANCE

Plant layout is an important decision as it represents long-term commitment. An ideal plant layout should provide the optimum relationship among output, floor area and manufacturing process. It facilitates the production process, minimizes material handling, time and cost, and allows flexibility of operations, easy production flow, makes economic use of the building, promotes effective utilization of manpower, and provides for employee’s convenience, safety, comfort at work, maximum exposure to natural light and ventilation. It is also

important because it affects the flow of material and processes, labour efficiency, supervision and control, use of space and expansion possibilities etc.

7.3.3 ESSENTIALS

An efficient plant layout is one that can be instrumental in achieving the following objectives:

- a) Proper and efficient utilization of available floor space
- b) To ensure that work proceeds from one point to another point without any delay
- c) Provide enough production capacity.
- d) Reduce material handling costs
- e) Reduce hazards to personnel
- f) Utilise labour efficiently
- g) Increase employee morale
- h) Reduce accidents
- i) Provide for volume and product flexibility
- j) Provide ease of supervision and control
- k) Provide for employee safety and health
- l) Allow ease of maintenance
- m) Allow high machine or equipment utilization
- n) Improve productivity

7.3.4 TYPES OF LAYOUT

As discussed so far the plant layout facilitates the arrangement of machines, equipment and other physical facilities in a planned manner within the factory premises. An entrepreneur must possess an expertise to lay down a proper layout for new or existing plants. It differs from plant to plant, from location to location and from industry to industry. But the basic principles governing plant layout are more or less same.

As far as small business is concerned, it requires a smaller area or space and can be located in any kind of building as long as the space is available and it is convenient. Plant layout for Small Scale business is closely linked with the factory building and built up area.

From the point of view of plant layout, we can classify small business or unit into three categories:

1. Manufacturing units
2. Traders
3. Service Establishments

1. Manufacturing units

In case of manufacturing unit, plant layout may be of four types:

- (a) Product or line layout
- (b) Process or functional layout
- (c) Fixed position or location layout
- (d) Combined or group layout

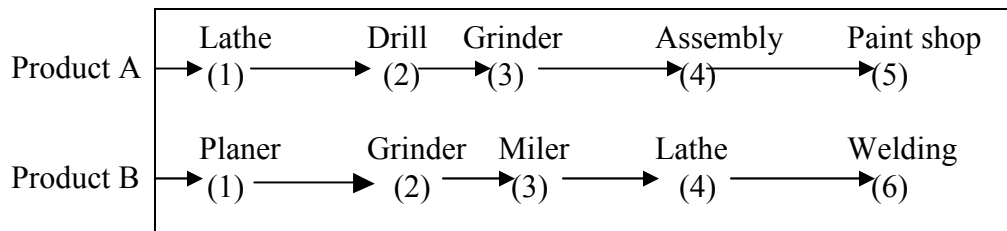
(a) Product or line layout:

Under this, machines and equipments are arranged in one line depending upon the sequence of operations required for the product. The materials move from one workstation to another sequentially without any backtracking or deviation. Under this, machines are grouped in one sequence. Therefore materials are fed into the first machine and finished goods travel automatically from machine to machine, the output of one machine becoming input of the next, e.g. in a paper mill, bamboos are fed into the machine at one end and paper comes out at the other end. The raw material moves very fast from one workstation to other stations with a minimum work in progress storage and material handling.

The grouping of machines should be done keeping in mind the following general principles.

- a) All the machine tools or other items of equipments must be placed at the point demanded by the sequence of operations
- b) There should no points where one line crossed another line.
- c) Materials may be fed where they are required for assembly but not necessarily at one point.
- d) All the operations including assembly, testing packing must be included in the line

A line layout for two products is given below.



Advantages: Product layout provides the following benefits:

- a) Low cost of material handling, due to straight and short route and absence of backtracking

- b) Smooth and uninterrupted operations
- c) Continuous flow of work
- d) Lesser investment in inventory and work in progress
- e) Optimum use of floor space
- f) Shorter processing time or quicker output
- g) Less congestion of work in the process
- h) Simple and effective inspection of work and simplified production control
- i) Lower cost of manufacturing per unit

Disadvantages: Product layout suffers from following drawbacks:

- a. High initial capital investment in special purpose machine
- b. Heavy overhead charges
- c. Breakdown of one machine will hamper the whole production process
- d. Lesser flexibility as specially laid out for particular product.

Suitability: Product layout is useful under following conditions:

- 1) Mass production of standardized products
- 2) Simple and repetitive manufacturing process
- 3) Operation time for different process is more or less equal
- 4) Reasonably stable demand for the product
- 5) Continuous supply of materials

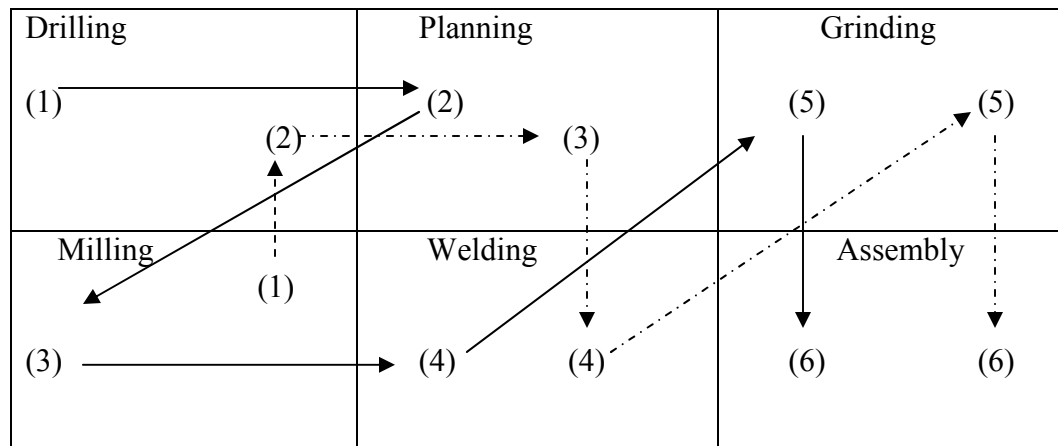
Therefore, the manufacturing units involving continuous manufacturing process, producing few standardized products continuously on the firm's own specifications and in anticipation of sales would prefer product layout e.g. chemicals, sugar, paper, rubber, refineries, cement, automobiles, food processing and electronics etc.

(b) Process layout:

In this type of layout machines of a similar type are arranged together at one place. E.g. Machines performing drilling operations are arranged in the drilling department, machines performing casting operations be grouped in the casting department. Therefore the machines are installed in the plants, which follow the process layout.

Hence, such layouts typically have drilling department, milling department, welding department, heating department and painting department etc. The process or functional layout is followed from historical period. It evolved from the handicraft method of production. The work has to be allocated to each department in such a way that no machines are chosen to do as many different job as possible i.e. the emphasis is on general purpose machine.

The work, which has to be done, is allocated to the machines according to loading schedules with the object of ensuring that each machine is fully loaded. Process layout is shown in the following diagram.



Product A: —————→

Product B: - - - - ->

Process layout showing movement of two products

The grouping of machines according to the process has to be done keeping in mind the following principles

- The distance between departments should be as short as possible for avoiding long distance movement of materials
- The departments should be in sequence of operations
- The arrangement should be convenient for inspection and supervision

Advantages: Process layout provides the following benefits

- a) Lower initial capital investment in machines and equipments. There is high degree of machine utilization, as a machine is not blocked for a single product
- b) The overhead costs are relatively low
- c) Change in output design and volume can be more easily adapted to the output of variety of products
- d) Breakdown of one machine does not result in complete work stoppage
- e) Supervision can be more effective and specialized
- f) There is a greater flexibility of scope for expansion.

Disadvantages: Product layout suffers from following drawbacks

- a. Material handling costs are high due to backtracking
- b. More skilled labour is required resulting in higher cost.
- c. Time gap or lag in production is higher
- d. Work in progress inventory is high needing greater storage space
- e. More frequent inspection is needed which results in costly supervision

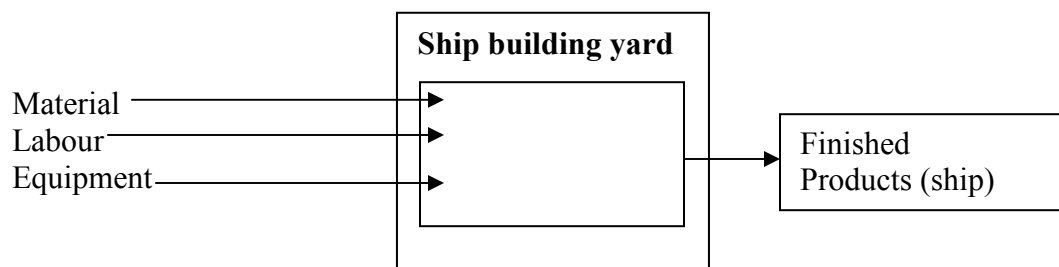
Suitability: Process layout is adopted when

1. Products are not standardized
2. Quantity produced is small
3. There are frequent changes in design and style of product
4. Job shop type of work is done
5. Machines are very expensive

Thus, process layout or functional layout is suitable for job order production involving non-repetitive processes and customer specifications and non-standardized products, e.g. tailoring, light and heavy engineering products, made to order furniture industries, jewelry.

(c) Fixed Position or Location Layout

In this type of layout, the major product being produced is fixed at one location. Equipment labour and components are moved to that location. All facilities are brought and arranged around one work center. This type of layout is not relevant for small scale entrepreneur. The following figure shows a fixed position layout regarding shipbuilding.



Advantages: Fixed position layout provides the following benefits

- a) It saves time and cost involved on the movement of work from one workstation to another.
- b) The layout is flexible as change in job design and operation sequence can be easily incorporated.
- c) It is more economical when several orders in different stages of progress are being executed simultaneously.
- d) Adjustments can be made to meet shortage of materials or absence of workers by changing the sequence of operations.

Disadvantages: Fixed position layout has the following drawbacks

- a. Production period being very long, capital investment is very heavy
- b. Very large space is required for storage of material and equipment near the product.
- c. As several operations are often carried out simultaneously, there is possibility of confusion and conflicts among different workgroups.

Suitability: The fixed position layout is followed in following conditions

1. Manufacture of bulky and heavy products such as locomotives, ships, boilers, generators, wagon building, aircraft manufacturing, etc.
2. Construction of building, flyovers, dams.
3. Hospital, the medicines, doctors and nurses are taken to the patient (product).

(d) Combined layout

Certain manufacturing units may require all three processes namely intermittent process (job shops), the continuous process (mass production shops) and the representative process combined process [i.e. miscellaneous shops].

In most of industries, only a product layout or process layout or fixed location layout does not exist. Thus, in manufacturing concerns where several products are produced in repeated numbers with no likelihood of continuous production, combined layout is followed. Generally, a combination of the product and process layout or other combination are found, in practice, e.g. for industries involving the fabrication of parts and assembly, fabrication tends to employ the process layout, while the assembly areas often employ the product layout. In soap, manufacturing plant, the machinery manufacturing soap is arranged on the product line principle, but ancillary services such as heating, the manufacturing of glycerin, the power house, the water treatment plant etc. are arranged on a functional basis.

2. Traders

When two outlets carry almost same merchandise, customers usually buy in the one that is more appealing to them. Thus, customers are attracted and kept by good layout i.e. good lighting, attractive colours, good ventilation, air conditioning, modern design and arrangement and even music. All of these things mean customer convenience, customer appeal and greater business volume.

The customer is always impressed by service, efficiency and quality. Hence, the layout is essential for handling merchandise, which is arranged as per the space available and the type and magnitude of goods to be sold keeping in mind the convenience of customers.

There are three kinds of layouts in retail operations today.

1. Self service or modified self service layout
2. Full service layout
3. Special layouts

The self-service layouts, cuts down on sales clerk's time and allow customers to select merchandise for themselves. Customers should be led through the store in a way that will expose them to as much display area as possible, e.g. Grocery Stores or department stores. In those stores, necessities or convenience goods should be placed at the rear of the store. The use of color and lighting is very important to direct attention to interior displays and to make the most of the stores layout.

All operations are not self-service. Certain specialty enterprises sell to fewer numbers of customers or higher priced product, e.g. Apparel, office machines, sporting goods, fashion items, hardware, good quality shoes, jewelry, luggage and accessories, furniture and appliances are all examples of products that require time and personal attention to be sold. These full service layouts provide area and equipment necessary in such cases.

Some layouts depend strictly on the type of special store to be set up, e.g. TV repair shop, soft ice cream store, and drive-in soft drink stores are all examples of business requiring special design. Thus, good retail layout should be the one, which saves rent, time and labour.

3. Services centers and establishment

Services establishments such as motels, hotels, restaurants, must give due attention to client convenience, quality of service, efficiency in delivering services and pleasing office ambience. In today's environment, the clients look for ease in approaching different departments of a service organization and hence the layout

should be designed in a fashion, which allows clients quick and convenient access to the facilities offered by a service establishment.

7.3.5 FACTORS INFLUENCING LAYOUT

While deciding his factory or unit or establishment or store, a small-scale businessman should keep the following factors in mind:

- a) *Factory building*: The nature and size of the building determines the floor space available for layout. While designing the special requirements, e.g. air conditioning, dust control, humidity control etc. must be kept in mind.
- b) *Nature of product*: product layout is suitable for uniform products whereas process layout is more appropriate for custom-made products.
- c) *Production process*: In assembly line industries, product layout is better. In job order or intermittent manufacturing on the other hand, process layout is desirable.
- d) *Type of machinery*: General purpose machines are often arranged as per process layout while special purpose machines are arranged according to product layout
- e) *Repairs and maintenance*: machines should be so arranged that adequate space is available between them for movement of equipment and people required for repairing the machines.
- f) *Human needs*: Adequate arrangement should be made for cloakroom, washroom, lockers, drinking water, toilets and other employee facilities, proper provision should be made for disposal of effluents, if any.
- g) *Plant environment*: Heat, light, noise, ventilation and other aspects should be duly considered, e.g. paint shops and plating section should be located in another hall so that dangerous fumes can be removed through proper ventilation etc. Adequate safety arrangement should also be made.

Thus, the layout should be conducive to health and safety of employees. It should ensure free and efficient flow of men and materials. Future expansion and diversification may also be considered while planning factory layout.

7.3.6 DYNAMICS OF PLANT LAYOUT

Plant layout is a dynamic rather than a static concept meaning thereby if once done it is not permanent in nature rather improvement or revision in the existing plant layout must be made by keeping a track with development of new machines or equipment, improvements in manufacturing process, changes in materials handling devices etc. But, any revision in layout must be made only when the savings resulting from revision exceed the costs involved in such revision.

Revision in plant layout may become necessary on account of the following reasons:

- a) Increase in the output of the existing product
- b) Introduction of a new product and diversification
- c) Technological advancements in machinery, material, processes, product design, fuel etc.
- d) Deficiencies in the layout unnoticed by the layout engineer in the beginning.

7.3.7 APPLICABILITY OF PLANT LAYOUT

Plant layout is applicable to all types of industries or plants. Certain plants require special arrangements which, when incorporated make the layout look distinct from the types already discussed above. Applicability of plant layout in manufacturing and service industries is discussed below.

In case of the manufacturing of *detergent powder*, a multi-storey building is specially constructed to house the boiler. Materials are stored and poured into the boiler at different stages on different floors. Other facilities are also provided around the boiler at different stations.

Another applicability of this layout is the manufacture of *talcum powder*. Here machinery is arranged vertically i.e. from top to bottom. Thus, material is poured into the first machine at the top and powder comes out at the bottom of the machinery located on the ground floor.

Yet another applicability of this layout is the *newspaper plant*, where the time element is of supreme importance, the accomplishment being gapped in seconds. Here plant layout must be simple and direct so as to eliminate distance, delay and confusion. There must be a perfect coordination of all departments and machinery or equipments, as materials must never fail.

Plant layout is also applicable to *five star hotels* as well. Here lodging, bar, restaurant, kitchen, stores, swimming pool, laundry, shaving saloons, shopping arcades, conference hall, parking areas etc. should all find an appropriate place in the layout. Here importance must be given to cleanliness, elegant appearance, convenience and compact looks, which attract customers.

Similarly plant layout is applicable to a *cinema hall*, where emphasis is on comfort, and convenience of the cinemagoers. The projector, screen, sound box, fire fighting equipment, ambience etc. should be of utmost importance.

A plant layout applies besides the grouping of machinery, to an arrangement for other facilities as well. Such facilities include receiving and dispatching points, inspection facilities, employee facilities, storage etc.

Generally, the receiving and the dispatching departments should be at either end of the plant. The storeroom should be located close to the production, receiving

and dispatching centers in order to minimize handling costs. The inspection should be right next to other dispatch department as inspections are done finally, before dispatch.

The maintenance department consisting of lighting, safety devices, fire protection, collection and disposal of garbage, scrap etc. should be located in a place which is easily accessible to all the other departments in the plant. The other employee facilities like toilet facilities, drinking water facilities, first aid room, cafeteria etc. can be a little away from other departments but should be within easy reach of the employees. Hence, there are the other industries or plants to which plant layout is applicable.

CHECK YOUR PROGRESS

1. The aim of a good store layout should be
 - a. Customer convenience
 - b. Stocking as much merchandise as can be placed in the store
 - c. The elimination of stockroom space
 - d. All of the above

2. one way to increase and direct customer traffic through the store is to
 - a. Make merchandise difficult to reach
 - b. Keep goods that are in heavy demand in convenient locations
 - c. Place items that are used together in different parts of the store
 - d. Organize the store so that customers do not have a view of the entire department

3. Which of the following stores would find the self-service type of layout most convenient?
 - a. A jewelry store
 - b. A supermarket
 - c. A shoe store
 - d. A coffee shop

4. You have come across various key words in this section. Pick up the words, which do not belong to this section.

Process layout

Production capacity

Special layout

Product mix

Handling cost

Employee morale

Job shops

Market segment

Demographic analysis

7.4 SUMMARY

In this lesson you have observed that the entrepreneur has to make decisions regarding plant location, which refers to the selection of a particular site for setting up a business or factory. But before making such a choice, he has to go through the detailed locational analysis considering various factors, which influence his decision. It is a long-term strategic decision, which cannot be changed once taken. An optimum location can reduce the cost of production and distribution to a great extent. Thus great care and appropriate planning is required to select the most appropriate location.

The efficiency of production depends on how well the various machines; production facilities and amenities are located in a plant. An ideal plant layout should provide the optimum relationship among the output, floor area and manufacturing process.

An efficient plant layout is one that aims at achieving various objectives like efficient utilization of available floor space, minimizes cost, allows flexibility of operation, provides for employees convenience, improves productivity etc. The entrepreneurs must possess the expertise to lay down a proper layout for new or existing plants. It differs from one plant to another. But basic principles to be followed are more or less same. From the point of view of plant layout, we can classify small business into three categories i.e. (a) manufacturing units (b) traders (c) service establishments. Designing of layout is different in all above three categories e.g. manufacturing unit may follow one of Product, Process, and fixed position or combined layout, as the case may be. Traders might go either for self-service or full service or special layouts whereas service establishments such as motels, hotels, and restaurants must give due attention to customer convenience, quality of service, efficiency in delivering the service etc. While deciding for layout for factory or unit or store, a small entrepreneur has to consider the factors like the nature of the product, production process, size of factory building, human needs etc.

Plant layout is applicable to all types of industries or plants. At the end, the layout should be conducive to health and safety of employees. It should ensure free and efficient flow of men and materials. Future expansion and diversification may also be considered while planning factory layout.

7.5 GLOSSARY

The various key words, which arise in this Lesson, are:

Business Environment – Implies aggregate of all forces, factors and institutions, which are external to and beyond the control of business organizations and their management

Continuous process - A process, which involves mass production of, standardized product repetitively.

Diversification – A process of entering into a field of business, which is new in terms of the market or technology or both

Expansion – Consists of increasing the sales revenue, profits and market share of existing product line or service

Entrepreneur - A person who is skilled at identifying new products (or sometimes new method of production), setting up operations for setting up new products, marketing the product and arranging the finance for the operations.

Handling cost - Cost of carrying material or storage cost.

Intermittent process –Is a process in which raw materials are converted into components or parts for stock. But they are combined according to customer orders.

Manufacturing – General term for the process of producing or assembling goods by hands or machines for sale to others.

Overhead cost – Operating costs of a business enterprise, which cannot be directly traced to a particular unit of product

Production capacity- Ability to produce in terms of units

Trader – A person who is engaged in buying and selling of goods.

7.6 SELF ASSESSMENT QUESTIONS

1. Describe the factors that should be taken into account in deciding the location of plant?
2. What is the importance of location in business?
3. The governing principle is that a plant should be so located as to permit the production of the product at the lowest cost per unit.” Comment.
4. What do you mean by locational analysis?

5. Explain the meaning and significance of plant location .How will you decide the location of a mini steel plant in India?
6. Define the plant layout.
7. What are the various factors influencing the layout of grocery store?
8. What are the principles for planning the layout of a new factory?
9. Explain process layout? State its advantages and disadvantages in brief
10. Distinguish between product layout and process layout?
11. Explain the suitability of fixed position layout
12. Write about any two types of plant layout
13. (13) What is plant layout? Discuss the objectives and advantages of a good layout

7.7 FURTHER READINGS AND SOURCES

- Charantinath M Poornima, Entrepreneurship Development Small Business Enterprises: Pearson Education First Impression, 2006
- Florence. P. Sargent, *Investment, Location and Size of plant*, London: Cambridge University Press, 1984
- Government of India (Office of the Economic Adviser), *Location of Industries in India*, New Delhi, 1963
- Lundy, James. L. *Effective Industrial Management*, New Delhi: Eurasia Publishing House, New Edition, 1984
- Sreekantaradhya, B.S., *Regional Dispersal of Industries*, New Delhi; Deep and Deep, 1985
- Weber, Alfred, *Theory of Location of Industries*, Chicago: The University of Chicago Press, 1929
- Asian Productivity Organisation, *Production Engineering*, Manila: APO, 1981
- Buffa Elwood S., *Operations Management*, New Delhi: Wiley Eastern, 1986
- Kumar Anil, S.C. Purnima, Abraham Mini K, K Jayashree, “Entrepreneurship development”: New Age International Private Limited Publisher, 2003
- Read Ruddel R., *Plant Layout – Factors, Principles and Techniques*, Illinois: Richard D. Irwin, 1978
- Gupta C.B. and Khanka S.S., Entrepreneurship and small business management: Sultan Chand and Sons 2003
- Shubin John A. and H. Madeheim, *Plant Layout*, New Delhi: Prentice Hall of India, 1986
- Gupta and Srinivasan, Entrepreneurial Development: Sultan Chand and Sons 1995

Brandt, Steven C.,The 10 Commandments for Building a Growth Company: Third Edition, Macmillan Business Books, Delhi 1977

Bhide, Amar V.,The Origin and Evolution of New Business: Oxford University Press, New York, 2000

Desai, Vasant, Small Scale Enterprises Vols. 1-12, Mumbai: Himalaya Publishing House, Latest Edition

Dollinger, Marc J., Entrepreneurship: Strategies and Resources, Illinois, Irwin, 1955

Taneja, Staish and Gupta SL, Entrepreneurship Development and New Venture Creation: Galgotia Publishing Co 2001

Holt, David H., Entrepreneurship: New Venture Creation, Prentice-Hall of India, New Delhi, Latest Edition

Panda, Shiba Charan, Entrepreneurship Development, New Delhi: Anmol Publications, Latest Edition

Patel, V.G. The Seven Business Crises and How to Beat Them: Tata-McGraw, New Delhi, 1995

Verma, J.C., and Gurpal Singh, Small Business and Industry – A handbook for Entrepreneurs, New Delhi, Sage, 2002

Ghosh, Bishwanath entrepreneurship development in India: National publishing house, Jaipur and New Delhi 2000