

LESSON 1

PRODUCERS COOPERATIVES: AS SOCIAL AND BUSINESS ENTERPRISES

Producers and Service Cooperatives as alternative business structure for total Human Development Production & services, whether agricultural or industrial, is an opportunity business venture for a producers and service cooperative. It brings about significant contributions to society through labor and productive use of people's money. It encourages the people to save and contribute to the capital of their cooperative.

Compared to other types of cooperatives, producer and service cooperatives have a greater impact on **people** and **community**. The production, processing and semi processing activities of the enterprise of producer cooperative has had a multiplier effect on the working force.

Manufacturing Operation versus Service Operations:

Manufacturing involves production of an output, such as shoes, bags or any goods that we can see and/or touch, while service generally involves the action like the drivers, auto mechanics repair, caregiver and/or projecting a film in a theater.

According to Stevenson, majority of service jobs fall into these categories:

- q Government (Local Government Unit, National)
- q Wholesale/ retail (Clothing, food, appliances, stationery, etc)
- q Financial Services (banking, lending, insurance etc.)
- q Health Care (Dentists, doctors, hospital care)

- q Personal Services (Laundry, dry cleaning, hair/beauty, gardening)
- q Business Services (data processing, delivery, employment agencies etc)
- q Education (schools, colleges etc)

Characteristic	Manufacturing	Service
Output	Tangible	Intangible
Consumer contact	Low	High
Uniformity of input	High	Low
Labor content	Low	High
Uniformity of output	High	Low
Measurement of productivity	Easy	Difficult
Opportunity to correct quality problems before delivery to customer.	High	Low

LESSON 2

AGRICULTURAL COOPERATION AND DEVELOPMENT

An effective tool for the attainment of the multiple goods of development, particularly economic goals. It is a specialized field in economics and represents an exact replica of the economy and the economic system.

2 Major Components

1. The idea of the people or entities working together, it involves farmers and their households
2. The idea that their intention is to realise mutual benefit involves greater outputs, higher productivity, improved income and the like from farming and related agricultural activities.

The importance of Agriculture cannot be **overemphasized**.

THE URGENCY OF NEED FOR AGRICULTURAL COOPERATION Page 8 Cooperative Production and Service Operations Management (COOP 40043) ASV 2020 Wide-ranging changes are taking place in the field of agriculture in developing countries, Agrarian Reform, food production, land settlements, supervise credit and technical assistance and other forms of incentives to farmers are breaking down the old agricultural

structure and opening up difficult problems as well as the unlimited opportunities.

AS A SPECIALIZED FIELD IN ECONOMICS - Every Economy or Economic System is concerned with solving three basic problems

a) the production problem of what goods and services to produce and in what quantities to produce them.

b) the technological problem of how to produce these goods and services.

c) the distribution problem of for whom these goods and services are to be produced.

LINKS WITH NATIONAL DEVELOPMENT The goals of development: The improvement of human welfare is the ultimate goal of national development.

PROBLEMS OF DEVELOPMENT: There are two major problems to the attainment of development,

one is complexity of the issue involved and

the other is the scarcity of the resources with which to deal with them, the former involves the requirement that they can be prioritized, that an optimum mix be found among multiple goals.

AGRICULTURAL COOPERATION AS A DEVELOPMENT TOOL

Cooperation as an organizational approach to development - Organization is clearly an important tool of development, along with men and machines. It is an organization that permits the methodical grouping and regrouping of all productive inputs for the achievement of maximum output.

Agricultural Cooperation For resource mobilization - The scarcity of resources for confronting wide-ranging problems

such are those in agriculture can slow down development if not prevent it altogether.

A Mechanism for Orienting Development to the people - Agricultural Cooperation as a form of organization possesses a built in capacity for rallying farmers to work hard for themselves and their fellow farmers.

AGRICULTURAL COOPERATION AND INDUSTRIALIZATION

Agricultural and industry are two sectors that are mutually interdependent for their growth.

Industrialization and Economic Development - Industrialization may be defined as the increasing share of the manufacturing sector in total output.

The workers significance and Cooperative identity: Whereas the workers put their value into their produce, whereas the capitalists gained profit from the product, and whereas the consumers consumed the product.

The **Producers Cooperative** is one that undertakes joint production whether agricultural or industrial. This type of cooperative is financed by members who pool their capital from among themselves.

- democratic organizations controlled by their member workers, who actively participate in setting their policies and making decisions.

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An Endless journey of the working class:

During the **Feudal period** in Europe, artisans and craftsmen organized their guilds in order to promote the welfare of their members, improve the quality of the products and to seek better markets for their goods. These were among the

forerunners of cooperative societies and shops, which originated in Europe. The members of these guilds were bakers, weavers, shoemakers, and other types of artisans and craftsmen. They discovered that it was more economical and effective for their social and economic interest by working together as a group or association.

In Great Britain: The experiences of the Rochdale Equitable Pioneers Society of the Hungry 40's show that this cooperative did not only engage in retailing.

In France: Under the form of producer cooperatives, the workers pool their resources to finance, own, and operate the enterprise in which they work.

In the Soviet Union: In the Soviet Union over 90% of agricultural production is accounted for in the cooperative system.

The New wave Co-operatives During the 1970s, a new wave of workers cooperative and service type of cooperative began to rise in Western Europe and in the USA.

The Mondragon Co-ops A key aspect of this renewed interest cooperative system was the discovery of the Mondragon cooperative in the Basque region of Spain.

The Objectives and Purpose of the Producers Cooperative:

1. To encourage the producers to do their best, and to work harder and better.
2. To increase the income and purchasing power of the members or the producers.
3. To stimulate capital formation for development activities.
4. To institutionalize cooperation as a technique for improving the social and economic status of the members.

5. To eliminate the services of middlemen so that the products could be sold.

LESSON 3

PRODUCTIONS AND OPERATIONS MANAGEMENT

Productivity is a measure of the effective use of resources, usually expressed as the ratio of output (goods or services) to input (labor, materials, energy, and other resources).

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

Examples:
Find the productivity for these cases:
 a. Four workers installed 720 square yards of carpeting in eight hours.
 b. A machine produce 68 usable pieces in two hours

a. Productivity = $\frac{\text{yards of carpet installed}}{\text{labor hours worked}} = \frac{720 \text{ square yards}}{32 \text{ hours}} = 22.5 \text{ yards / hour}$

b. Productivity = $\frac{\text{Usable pieces}}{\text{Production time}} = \frac{68 \text{ pieces}}{2 \text{ hours}} = 34 \text{ pieces / hour}$

Factors that Affects Productivity:

- method
- capital
- quality
- (management

Improving productivity

1. Develop productivity measures for all operations (operating policies).
2. Look at the system as a whole in deciding which unit/phase was most critical in operation.
3. Develop methods for achieving productivity improvements, such as consultation and solicitation of ideas from worker-owners, studying how other firms have increased productivity, and reexamining the way work is done.
4. Establish reasonable goals for improvement.

5. Make it clear that management support is important and encourage productivity improvements.
6. Measure improvements and publicize them.
7. Don't confuse productivity with efficiency.

Competitiveness How effectively a cooperative meets the needs of customers relative to goods or services are dependent on competitiveness determinants

Price – is the amount a customer must pay for the product or service. .

Quality – refers to materials, workmanship and arts/design used in the goods/services.

Product differentiation – refers to any special feature (e.g. design, cost, quality, friendly users, and warranty) that causes a product or service to be perceived by the buyer as more suitable than a competitor's product or service.

Flexibility – is the ability to respond to changes.

Time – It involves a different phase of operations.

LESSON 4

LOCATION PLANNING

Introduction When a well-known real estate broker was asked what the three most important determinants of a value of a property are? She said, "That's Easy, Location, location, location."

Importance of Location Decision - There are two primary reasons that location decisions are highly an important part of production system design. One is that we **entail a long-term commitment**, which makes mistakes difficult to overcome.

A plant once located may find itself, after a few years, cramped for space or incurring high shipping costs because our suppliers have moved out. Since it is costly to move or to relocate, site selection is a long-term commitment. Thus, locating involves the avoidance of undesirable aspects of location. The other is that **location decisions often have an impact on the operating cost**. It can be through fixed and variable cost, and revenues.

Objectives of Location Decision - As a general rule profit oriented organization based their decision on profit potential.

Location Options - There are essential **four (4)** options that the board of directors and coop managers can consider in location planning.

1. Expand an existing facility.
2. Add new location while retaining existing ones
3. Shut down at one location and move to another.
4. Doing Nothing

Factors that affect Location Decision: Many Factors can influence location decisions. However, it often happens that one or a few factors are so important that they tend to dominate the location decision.

A. Regional Factors

1. **Location of raw material** – Firms are located near or at the source of raw materials for three primary reasons: necessity, perish ability, and transportation costs.

2. **Location of market** - Non-profit organizations choose locations relative to the needs of the users of their services.

3. Labor factors – Primary considerations for labor must relate to the wage rate and availability of manpower in the area.

4. Other Factors – Climate and taxes sometimes play a role in location decisions.

B. Community Considerations – Many communities actively try to attract new businesses because they are viewed as potential sources of future revenues and new job opportunities.

C. Site related factors - The site's primary consideration involves land, transportation, zoning and various ordinances.

LEVEL	FACTORS	CONSIDERATION
A. Region/Country	<ul style="list-style-type: none"> ◆ Location of raw material or supplies ◆ Location of Markets ◆ Labor 	<ul style="list-style-type: none"> ◆ Proximity, Modes and costs of transportation, quantity available ◆ Proximity, distribution costs, target market, trade practices ◆ Availability (general and for specific skills)
B. Community	<ul style="list-style-type: none"> ◆ Facilities ◆ Services ◆ Attitudes ◆ Taxes ◆ Environmental Regulation ◆ Utilities ◆ Development Support 	<ul style="list-style-type: none"> ◆ School, Churches, Shopping, Housing ◆ Medical fire and police ◆ Pros/cons ◆ State/Local: direct/indirect ◆ State/Local ◆ Cost and availability ◆ Bond issues, tax abatement, low cost loans and grants.
C. Site	<ul style="list-style-type: none"> ◆ Land ◆ Transportation ◆ Environmental/Legal 	<ul style="list-style-type: none"> ◆ Cost, degree of development required, Soil characteristics, room for expansion, parking ◆ Type (access road, railspurs, air freight) ◆ Zoning restriction

Evaluating Location Alternatives: This section contains descriptions of several techniques that are used to help management evaluate location alternatives: locational cost-volume analysis, factor rating and the center of gravity method

Location Cost-Analysis Volume - The Economics comparison of location alternatives facilitated the use of cost-volume profit analysis. \

The procedure for location cost volume analysis involves these steps:

1. Determine the fixed cost and the variable cost associated with each location's alternatives.

2. Plot the total cost lines for all location alternatives on the same graphs 3. Determine which location has the lowest total cost for the expected level of output.

These methods assumes the following:

1. Fixed costs are constant for the range of probable output.
2. Variable costs are linear for the range of probable output.
3. The required level of output can be closely estimated.
4. Only one product is involved.

Example: Fixed and variable costs for four potential plant locations are shown below:

Location	Fixed cost per year	Variable cost per unit
A	P 250,000	P 11
B	100,000	30
C	150,000	20
D	200,000	35

- a. Plot the total cost lines for these locations on a single graph.
- b. Identify the range of output for which each alternative is superior (i.e., has the lowest total cost). If expected output at the selected location is to be 8,000 units per year, which location would provide the lowest cost?

Solution

- a. To plot the total – cost lines; select an output that is approximately equal to the expected output level (e.g., 10,000 units per year). Compute the total cost for each location at the level:

	Fixed cost	+	Variable cost	=	Total cost
A.....	\$250,000	+	\$11 (10,000) =		\$360,000
B.....	100,000	+	30 (10,000) =		400,000
C.....	150,000	+	20 (10,000) =		350,000
D.....	200,000	+	35 (10,000) =		550,000

Plot each location's fixed cost (at Output = 0) and the total cost at 10,000 units; and connect the two points with the straight line. (See the accompanying graph.)

- c. The approximate ranges for which the various alternatives will yield the lowest cost are shown on the graph. Note that location D is never superior. The exact ranges can be determined by finding the output level at which lines B and C and lines C and A across. To do this set their total cost equations equal and solve for Q, the break-even output level. Thus, for B and C.

$$\begin{aligned}
 & \text{(B)} & \text{(C)} \\
 & \$100,000 + \$30Q = \$150,000 + \$20Q \\
 & \text{Solving, you find } Q = 5,000 \text{ units per year.} \\
 & \text{For C and A:} \\
 & \text{(C)} & \text{(A)} \\
 & \$150,000 + \$20Q = \$250,000 + \$11Q \\
 & \text{Solving, } Q = 11,111 \text{ units per year.}
 \end{aligned}$$

- d. From the graph, you can see that for 8,000 units per year, location C provides the lowest total cost.

LESSON 5

FORECASTING

A **forecast** is a statement about the future. Planning is an integral part of production management. If there is uncertainty that clouds the planning horizon, management will find it difficult to plan effectively. Forecasts help the management to plan effectively by reducing some of the uncertainty.

There are two uses of forecasts. One is to help management **plan the system**, and the other is to help them **plan the use of the system**.

Purpose of Forecasting: Forecasting the demand needed for the products is not like weather forecasting as what farmers usually do. In both instances, we cannot be sure that our prediction will usually turn to reality. Prediction of things to come is like assuming the ball is in the park, but usually we find the ball and we miss the park completely. In that instances of assumption, prediction, and forecasting will serve as our **basis for planning**

Seven (7) Elements of Good Forecasts

1. Timely
2. Accurate
3. Reliable
4. Meaningful Units
5. In writing
6. Simple to Understand
7. Simple to Use

Steps in the Forecasting Procedures

1. Determine the purpose of the forecast and when it will be needed.
2. Establish a time horizon.
3. Select a forecasting technique
4. Gather and analyse appropriate data, and then prepare the forecast.
5. Prepare the forecast.
6. Monitor the forecast.

Approaches to Forecasting There are two general approaches to forecasting, **QUALITATIVE & QUANTITATIVE**.

Forecast based on judgment and opinion - Judgmental forecasts rely on analysis of subjective inputs obtained from various sources, such as consumer surveys, the sales staff, managers and executive, and panels of experts. Quite, Frequently these sources provide insights that are not otherwise available.

Associative Forecast Associative Models involve identification of one or more variables that can be used to predict future demand.

FORECASTING TECHNIQUES

Forecast based on Judgment and Opinion: When the forecast must be prepared quickly, there is usually not enough time to gather and analyse quantitative data.

Executive Opinions: A small group of upper-level managers or executive committee or board of directors (together with the general manager) may meet and collectively develop a forecast.

Sales Force Composite: The sales staff is often a good source of information because of its direct contact with consumers, thus people are often aware of any plans the consumers may be considering for the future.

Consumers Survey: Since the consumer is the one who will ultimately determine demand, it seems natural to solicit input from consumers.

Opinion of Managers and Staff: The Board of Directors and Manager may use the staff to generate a forecast or to provide some several forecasting alternatives from which to choose.

Forecasting based on Time series Data **A time series** is a time-ordered sequence of observations taken at regular intervals over a period of time (e.g., hourly, daily, weekly, monthly, quarterly, annually).

These behaviors can be described as follows:

1. **Trend** refers to a gradual long-term movement in the data

2. Seasonality refers to short-term, fairly regular variations generally related to factors such as weather, holidays, and vacations.

3. Cycles are wavelike variations of more than one year's duration.

4. Irregular variations are due to unusual circumstances such as severe weather conditions, strikes, or a major change in a product or service.

5. Random variations are residual variations that remain after all other behaviors have been accounted for.

Techniques for Averaging It generates a forecast that reflects recent values of a time series.

Three techniques for averaging are described in this method:

1. Naïve Forecast: The simplest forecasting technique is the Naïve forecast. A naïve forecast for any equal periods and previous period's active actual value.

2. Moving Averages One weakness of the naive method is that it causes the forecast to trace the actual data with a lag of one period, it does not smooth at all.

The moving average forecast can be computed using the following equation

The moving average forecast can be computed using the following equation

$$MA = \frac{\sum_{i=1}^n A_i}{n}$$

Where:

n = "age" of the data ($n=1,2,3,\dots$)
 n = Number of periods in the moving average
 A_i = Actual value with age i
 MA = forecast

For example, MA3 would refer to a three period moving average forecast, and MA5 would refer to a five-period moving average forecast.

Example:

Compute a three period moving average forecast given demand for shopping carts for the last five periods.

Period	Age	Demand
1	5	42
2	4	40
3	3	43
4	2	40
5	1	41

Solution:

$$MA3 = \frac{43+40+41}{3} = 41.33$$

If actual demand to period 6 turns out to be 39, the moving average forecast for period 7 would be: $MA3 = \frac{40+41+39}{3} = 40.00$

Note: that in a moving average, as each new actual value becomes available, the forecast is updated by adding the newest value the oldest and the re computing the average. Consequently, the forecast "moves" by reflecting only the most recent values.

3. Exponential Smoothing: It is one the most widely used techniques in forecasting, partly because of its minimal data storage requirements and ease of calculation and partly because of ease with which the weighing scheme can be altered.

the difference between that forecast and the actual value of the series at that point. That is:

Next forecast = Previous forecast + α (Actual - previous forecast)
 Where α is percentage and (actual - previous forecast) represents the forecast error. More concisely,
 $F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1})$

Where:

F_t = forecast for period t
 F_{t-1} = forecast for period $t-1$
 α = smoothing constant
 A_{t-1} = Actual demand or sales for period $t-1$

The smoothing constant α represents a percentage of the forecast error. Each new forecast is equal to the previous forecast plus a percentage of the previous error. For example, suppose the previous forecast was 42 units, actual demand was 40 units, and $\alpha = .10$. The new forecast would be computed as follows:
 $F_t = 42 + .10(40-42) = 41.8$

Then, if the actual demand turns out to be 43, the next forecast would be:
 $F_t = 41.8 + .10 (43-41.8) = 41.92$

Example: Use exponential smoothing to develop a series of forecasts or the following data, and compute (Actual - forecast) = Error, for each period.

- Use a smoothing factor of .10
- Use of smoothing factor of .40.
- Plot the actual data and both sets of forecasts on a single graph.

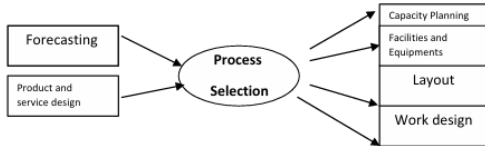
Period (t)	Actual demand
1	42
2	40
3	43
4	40
5	41
6	39
7	46
8	44
9	45
10	38
11	40
12	40

Period	Actual demand	$\alpha = .10$ Forecast	Error	$\alpha = .40$ Forecast	Error
1	42	-	-	-	-
2	40	42	-2	42	-2
3	43	41.8	1.2	41.2	1.8
4	40	41.92	-1.92	41.92	-1.92
5	41	41.73	-0.73	41.15	-0.15
6	39	41.66	-2.66	41.09	-2.09
7	46	41.39	4.61	40.25	5.75
8	44	41.35	2.15	42.55	1.45
9	45	42.07	2.93	43.13	1.87
10	38	42.35	-4.35	43.88	-5.88
11	40	41.92	-1.92	41.53	-1.53
12		41.73		40.92	

LESSON 6

Process Selection refers to the way an organization chooses to produce its goods or provide its services.

Process Selection and System Design



Types of Processing:

1. Continuous processing
2. Repetitive/assembly
3. Batch processing
4. Job shops
5. Projects are special case

Computer - aided manufacturing (CAM) refers to the use of computers in process control, ranging from robots to automated quality control.

Numerically controlled machines are programmed to follow a set of processing based on mathematical relationships that tell the machine the details of the operation to be performed.

Flexible Manufacturing System (FMS) A flexible manufacturing system (FMS) is a group of machines that include supervisory computer control, automatic material handling, and possibly robots or other automated processing equipment.

Computer - Integrated Manufacturing (CIM) Computer - integrated manufacturing (CIM) is a system for linking a broad range of manufacturing activities through an integrating computer system, including engineering design, flexible manufacturing system, and production planning, and control.

Capacity - refers to an upper limit or ceiling on the load that an operating unit can handle.

Effective Capacity determinants:

1. Facilities
2. Products or Services
3. Processes

4. Human Consideration
5. Operation
6. External Forces

1. Facilities: The design of facilities, including the size and provision for the expansion, is very important.

2. Product and Services Product or services design can have tremendous influence on capacity.

3. Process The quantity capability of a process is an obvious determinant of capacity.

4. Human Human resources are the exclusive and important components of production without it, it will paralyzed the operation of any production company.

5. Operation If there are many differences in equipment capabilities it affects operation of production and its effectiveness.

External Factors Government regulations, ordinances, and local laws are external factors to consider in plant capacity.

Determining Capacity Requirements: Capacity planning decisions involve long-term and short-term consideration.

Cost Volume Analysis and Break Even Analysis:

Focuses on relationship between cost, revenue, and volume of output. The purpose of cost-volume analysis is to estimate the income of cooperative under different operating conditions.

Use of the techniques requires identification of all costs related to the production of a given product. These costs are then assigned to **fixed costs** or variable costs. Fixed costs tend to remain constant regardless of volume of output. **Variable costs** vary directly with volume of output. The major components of variable costs are generally materials and labor costs. We will assume that variable cost per unit remains the same regardless of volume of output.

The total cost associated with a given, volume of output is equal to the sum of the fixed cost and variable cost per unit times volume.

$$TC = FC + VC \times Q$$

FC = **Fixed Cost** - are those that tend to remain constant regardless of Volume of output.

VC = **Variable Cost** - vary directly with volume of output. The major Components of variable cost are material and labor

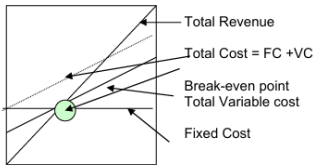
Q = Quantity or volume of output

TC = Total Cost

QBEP = Break even quantity

TR = Total Revenue
SP = Specified Profit

P = Profit
R = Revenue



Revenue per unit, like variable cost per unit, is assumed to be the same regardless of quantity. The total revenue will have a linear relationship to output, assume that all output can be sold. The total revenue associated with a given quantity of output.

$$Q = R \times Q$$

The difference between total revenue and total cost and volume of output, is the volume at which total costs and total revenue are equal is referred to as the break-even point (BEP). When volume is less than the break-even point there is a loss rather than a profit; when a volume is greater than the break-even point there is a profit. The greater the deviation from this point, is the greater the profit or loss. Total profit can be computed using the formula:

$$P = TR - TC$$

$$= R \times Q - (FC + VC \times Q)$$

The required volume needed to generate a specified profit is:

$$\text{Volume} = \frac{SP + FC}{R - VC}$$

A special case of this is the volume of output needed for total revenue to equal total cost. This is the break-even point, computed using the formula:

$$QBEP = \frac{FC}{R - VC}$$

Example:

The owner of Sampaloc Multi purpose Cooperative, R. Bughao, is contemplating adding a new line of pies, which will require leasing new equipment for a monthly payment of P 6,000.00. Variable costs would be P2.00 per pie, and pies would retail for P 7.00 each.

- How many pies must be sold in order the break even?
- What would the profit (loss) be if 1,000 pies are made and sold in a month?
- How many pies must be sold to realize Profit of P 4,000.00?

Solution:

FC = P 6,000.00 VC = P 2 per pie Rev = P 7 per pie

a. $QBEP = \frac{FC}{R - VC} = \frac{P 6,000.00}{P 7 - P 2} = 1,200 \text{ pies / month}$

b. For Q = 1,000, $P = REV \times Q - (FC + VC \times Q)$

$= P 7 \times 1,000 - (P 6,000 + P 2 \times 1,000) = P 1,000.00$

c. $P = PHP 4,000$: solve for Q in the preceding equation:

$PHP 4,000 = PHP 7 Q - (PHP 6,000 + PHP 2 Q)$

Rearranging terms, we obtain

$PHP 5 Q = PHP 10,000Q = 2,000 \text{ pies}$

LESSON 7

Product Design as a major factor in Member and Non-member's (Customer) Satisfaction The essence of any cooperative and organization is the product it offers.

The need for **Product Design**: It might seem that the matter of product is one time necessity for new items, then once it is done, no further attention is needed.

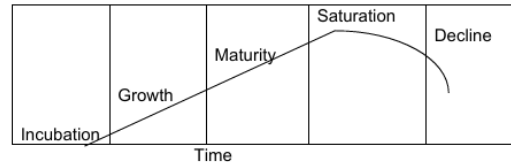
Basic research is intended to advance scientific knowledge and it generally does not have any commercial purposes.

Applied research is designed to produce commercial benefits.

Development involves converting the result of applied research into useful commercial application because basic

research does not lead to commercial applications, and is generally underwritten by the government and large corporations. **Applied research** has the objective of achieving commercial application that appeals more to bigger organisations.

Product Life Cycle



Standardization of parts to achieved competitiveness for industrialized nations and cooperatives. A major contributing factor to the high rate of productivity achieved by industrialized nations is the standardization of parts

Advantages and Disadvantages of Standardization:

- Fewer parts to deal with in inventory and in manufacturing.
- Reduces training cost and time.
- Purchasing, handling and inspection processes become more routine.
- Orders can be field/ filled from inventory.
- Provides opportunities for long production runs and automation.
- Needs for fewer parts justifies increase expenditures on preferring designs and improving quality control procedures.

Disadvantages:

- Designs may be frozen with too many imperfections remaining.
- High cost of design changes increases resistance to improvements.
- Decreasing variety results in less consumer appeals.

LESSON 8

Lay outing of facilities should be systematized to maximize coop resources As in other areas of system design, layout decisions are important for

three basic reasons: (1). They require substantial investments of money and effort. (2). They involve long-term commitments, which make mistakes difficult to overcome, and (3). They have a significant impact on the cost and efficiency of short-term operation.

Plant Lay out: Plant layout involves deciding the location of work areas, offices, machine, equipment, lights, aisle, electrical outlets, washrooms and storerooms and other facilities in the plant or office.

Basic Pattern:

1. Process layout or functional layout

These are groups of machines that perform the same function.

2. Product layout If only one or few standard products are being made, the product or assembly lines layout is desirable.

3. Assembly Floor layout In the assembly floor layout, assembly of the product takes place in one location, and parts and tools are brought to the job.

The Layout Chart: It is most desirable that the supervisor acquired a further sense of the situation by making a layout chart to accompany his process or operation chart.

Constructing a Layout Chart:

1. Placement of materials and equipment near those who use them most.
2. Provision for effective supervision.
3. Comfort and safety of workers.
4. Attractiveness
5. Economy

Several standards have been developed in laying out the office or shop. These standards provide the supervisor with some basis of determining the space improvement possibilities. These are the following:

1. Each person should be provided an area between eighty to one hundred square feet.
2. Main aisle should be four to five feet in width, side aisle three to four feet.
3. The seating space between the desks should be approximately three feet.
4. Large open spaces should be provided for light and ventilation.
5. Persons doing close work should be place in the best light
6. No one should be placed in the position facing the light.
7. All desks should face the same direction.
8. People doing similar types of work should be grouped together.

Evaluating Layout Proposals: A developed layout plan may be evaluated in terms of two criteria:

1. The space used If the proposed layout contains all the required equipment, conforms to the standard suggested, and at the time reduces the total amount of space necessary for the operation, it can be presumed to be desirable.

2. The distance traveled The second criterion may be used when lines of flow for a particular process have been identified on the layout chart.

Plant Layout Checklist:

- A. Material Handling
- B. Production and Production Control
- C. Building and its Surroundings
- D. Product Design and Engineering
- E. Service Areas and Employee Comfort

Selecting Site for Equipment:

- 1. Required path of travel** - This refers to the path followed by materials leaving a particular location.
- 2. Nature of materials** - A second factor is the nature or characteristics of the materials to be transported.
- 3. Physical characteristics** of the building - The analyst will also consider

the factor of building characteristics when designing the material handling system. The floor load capacity will have some effect on the weight of the material handling equipment which can be used in certain areas.

4. Space requirements of handling equipment - It has been mentioned that some equipment require floor space, whereas other equipment required overhead space.

5. Required handling capacity - After the analyst decides what kind of equipment should be used to transport materials between two points, he will take into account what the total handling capacity of this equipment must be.

6. Cost Consideration - One major factor remains to be considered, and this is the cost associated with the specific type of equipment.

LESSON 9

Inventory - is a stock or store of goods. Firms typically stock hundreds or even thousands of items in inventory, ranging from small things such as pencils, paper clips, screws, nuts, and bolts to large items such as machines, trucks, construction equipment, and airplanes.

Dependent Demand - items are typically sub-assemblies or component parts that will be used in the production of a final or finished product.

Independent Demand - items on the other hand are the finished goods or other end items.

Function of Inventory:

1. To meet anticipated demand.
2. To smooth production requirements
3. To do couple components of the production-distribution system
4. To protect against stock outs
5. To take advantage of order cycle

6. To hedge against price increase
7. To permit operations

Objectives of Inventory Control:

- A. To maximise the level of customer / member service,
- B. To minimise the cost of providing a certain level of customer / member service

Inventory Counting System:

1. Periodic System - a physical count of items in inventory is made at periodic intervals (weekly, monthly) in order to decide how much to order.

2. Continuous inventory system - (also known as a perpetual system) keeps track of removals from inventory on a continuous basis, so the system can provide the information on the current level of inventory for each item.

3. Two-bin - it involves the use of two containers for inventory. (Reorder when the first is empty)

4. Batch or On-line inventory records are collected periodically and entered into the system. In on-line systems, the transactions are recorded instantaneously. The advantage of on-line systems is that they are always up-to-date.

5. Universal product code-or bar code - they give managers continuous information and inventories, they reduce the need for periodic inventories and order-size determinations, and they improve the level of customer service.

Cost Information:

1. Holding or Carrying Cost - relate to physically holding items in storage.

2. Ordering Cost - is the cost associated with ordering and receiving inventory.

3. Shortage Cost - result when demand exceeds the supply of inventory on hand.

INVENTORY MODELS

A. Economic Quantity Models –How much to order The question of how much to order is frequently determined by using

an **economic order quantity (EOQ)** model. EOQ models identify the optimal order quantity in terms of minimizing the sum of certain annual costs that vary with order size.

Three order size models are described in the following sections:

1. The economic order quantity model.
2. The economic order quantity model with non-instantaneous delivery
3. The quantity discount model

Basic Economic Order Quantity (EOQ) Model The basic EOQ model is the simplest model. It is used to identify the order size that will minimize the sum of the annual cost of holding inventory and ordering inventory.

Assumption of the basic EOQ model

1. Only one product is involved.
2. Annual demand requirements are known.
3. Demand is spread evenly throughout the year so that the demand rate is reasonably constant.
4. Lead time does not vary.
5. Each order is received in a single delivery.

LESSON 10

Prior to the Industrial Revolution, skilled craftsmen performed all stages of production. **Pride of workmanship and reputation often provided the motivation to see that a job was done right.** Lengthy guild apprenticeships caused this attitude to carry over to new workers. Moreover one person or a small group of people were responsible for an entire product.

Defining Quality The term quality is used in a variety of ways. Sometimes it refers to the grade of a product.

Quality of Design It refers to the intention of the designer to include or exclude certain features in a good service.

Quality of Conformance It refers to the degree to which goods and services conform to the intent of the design.

The importance of Quality As a rule, consumers are influenced by two major factors when making buying decisions: availability and quality.

Some of the major ways that quality affects an organization are:

1. Reputation and Images
2. Liability
3. Productivity
4. Costs

An organization's **reputation and images** are generally associated with the cost and the quality of goods and services it provides.

Organisations must pay special attention to their potential **liability** due to the damages or injuries resulting from either faulty design or poor workmanship.

Productivity and quality are often closely related.

Poor quality increases certain **costs** incurred by the organization.

Determinants of Quality

1. Design
2. Conformance to design
3. Consumer Education
4. Service After Delivery

The **design phase** is the starting point for the level of quality that is eventually achieved.

Some of the major sources of improvements are research and development, competitors, customers and employees.

1. **Research and Development** -involves exploring new or different equipment, materials, processes, packaging or methods that have the potential for yielding the quality improvements

2. **Competitors** -it is often a source of quality improvements, although at first glance, it may seem unethical to adopt another firm's ideas.

3. **Customer and Consumers** -there is often a valuable source of ideas for quality improvement, either via suggestions they offer or via complaints received.

4. **Employee** - Can often provide suggestions for improvements both in the design of a product or services and in the way the products or services are processed.

Quality Assurance A comprehensive approach to quality that begins with product or services designs

Quality Control Largely based on the statistical procedures.

Inspection Monitoring in the production process can occur at three points: before production, during production, and after production.

The purpose of inspection is to provide information on the degree to which items conform to a standard. The basic issues are:

1. How much to inspect and how often.
2. At what points in the process inspection should occur.
3. Whether to inspect in a centralized or on-site location.
4. Whether to inspect attribute or variables

Where to Inspect in the process:

1. Raw materials and purchased parts
2. Finish Products.
3. Before a costly operation.
4. Before an irreversible process.
5. Before a covering process.

Statistical Process Control Statistical process control is used to evaluate the

output of a process to determine its acceptability.

Effective control requires the following steps:

1. Define
2. Measure
3. Compare to a standard
4. Evaluate
5. Take corrective action if necessary
6. Evaluate corrective action.

Tolerance, Control, Limits and Process Variability

1. **Tolerances** are specifications established by engineering design or customer requirements.

2. **Control Limits** are statistical limits that reflect the extent to which sample statistics such as means and ranges can vary due to randomness alone.

3. **Process variability** reflects the natural or inherent (i.e. random) variability in a process.

LESSON 11