Theory Notes of

Horti-Business management Credits: 2 (2 + 0)

Prepared By

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Lecture 1 Farm Management: definition, nature, characteristics and scope ----------
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Farm Management:

Meaning

Farm Management comprises of two words i.e. Farm and Management. Farm means a piece of land where crops and livestock enterprises are taken up under common management and has specific boundaries.

Farm is a socio economic unit which not only provides income to a farmer but also a source of happiness to him and his family. It is also a decision making unit where the farmer has many alternatives for his resources in the production of crops and livestock enterprises and their disposal.

Hence, the farms are the micro units of vital importance which represents centre of dynamic decision making in regard to guiding the farm resources in the production process.

Management:

Management is the art of getting work done out of others working in a group. Management is the process of designing and maintaining an environment in which individuals working together in groups accomplish selected aims. Management is the key ingredient. The manager makes or breaks a business. Management takes on a new dimension and importance in agriculture which is mechanised, uses many technological innovations, and operates with large amounts of borrowed capital.

Definitions of Farm Management

- ❑ The art of managing a Farm successfully, as measured by the test of **profitableness** is called farm management. (L.C. Gray)
- ❑ Farm management is defined as the science of **organisation** and **management** of farm enterprises for the purpose of **securing** the **maximum continuous profits**. (G.F. Warren)
- ❑ Farm management may be defined as the science that deals with the organisation and operation of the farm in the context of **efficiency** and **continuous profits**. (Efferson) ❑ Farm management is defined as the study of business phase of farming.
- ❑ Farm management is a branch of agricultural economics which deals with **wealth earning and wealth spending activities of a farmer**, in relation to the organisation and operation of the individual farm unit for securing the maximum possible net income. (Bradford and Johnson)

Nature of Farm Management

Farm management deals with the **business principles of farming** from the point of view of an **individual farm**. Its field of study is limited to the individual farm as a unit and it is interested in **maximum possible returns** to the **individual farmer**. It applies the local knowledge as well as scientific finding to the individual farm business. Farm management in short be called as a science of **choice or decision making**.

Scope of Farm Management

Farm Management is generally considered to be MICRO ECONOMIC in its scope. It deals with the allocation of resources at the level of individual farm. The primary concern of the farm management is the farm as a unit. Farm Management deals with decisions that affect the profitability of farm business. Farm Management seeks to help the farmer in deciding the problems like what to produce, buy or sell, how to produce, buy or sell and how much to produce etc. It covers all aspects of farming which have bearing on the economic efficiency of farm.

The subject of farm management includes farm management research, teaching and extension.

(a) Farm Management Research

There are several issues for consideration of farm management research.

Sustainability: Farm has to earn profits during the short term and the long term. Hence there is greater attention on devising methods for ensuring sustainable farm profits.

Farm mechanization: Labor shortages are likely increasing in future. Hence research focus is on identifying activities in the farm which could be mechanized and developing farm machineries that suit India's predominantly small and marginal farms.

Managing risk and uncertainty: Research is undertaken to arrive at optimum enterprise combinations that would minimize risk and maximize profits.

Farm planning: Resources at the farm are limited. Some of them are purchased, hired or available in the farm. Farm plans have to be prepared considering the limited resources, range of crop and allied activities that could be undertaken, technologies that could be implemented and mainly the market requirements. Several planning tools are available to prepare farm plans considering integrated farming systems.

(b) Farm Management Education

The major focus of Farm management education is to equip students with knowledge and skills required for being an efficient farm manager. This includes preparation of farm resources inventory and farm layout, understanding market needs, farm planning and budgeting, resource mobilization, implementation of farm plans, monitoring and control. The students are trained to analyze the alternatives and decide the course of action. Micro-economics principles, natural and human resource management, financial management and accounting, are covered in farm management.

(c) Farm Management Extension

Various methods of technology transfer are the main focus of farm management extension. Traditionally, farm management extension has concentrated on integrated farming system and use of improved varieties and technologies to maximize productivity. Now a days, in addition to these, the emphasis is on market oriented agriculture, post harvest management and farm level processing, maintaining food safety and quality standard at farm level to facilitate exports, organic farming, group farming (farmers commodity groups - collective decision making) and protected horticulture.

Characteristics of Farm Management

- Practical science: It is a practical science, because while dealing with the facts of other physical and biological sciences, it aims at testing the applicability of those facts and findings and showing how to put these results to use on a given situation.
- Profitability oriented: Farm management science alone is interested in profitability along with practicability of an idea. Farm management specialists always consider the cost involved in producing each unit of output in relation to returns and decides the optimum level of production. In the decision making process, profitability is thus the major criterion of selection of enterprise or practices. In short, when other sciences deals with physical efficiency, the farm management concerns with economic efficiency.
- Integrating science: It is an integrating science in a sense that the facts and findings of other sciences are co-ordinated for the solution of various problems of individual farmers with a view to achieving certain desired goals.
- Broader field: Farm management decisions are made by getting information from more than one discipline. A farm management specialist has to know the broad principles of all other concerned sciences in addition to specialization in the business principles of farm management.

- Micro approach: Farm management has a micro approach and it treats every farm unit unique in available resources, problems and potentialities.
- Farm unit as a whole: In farm management analysis, a farm as a whole is considered to be the unit for making decisions because the objectives is to maximise the returns from the whole farm instead of only improving the returns from a particular enterprise or a practice.

Lecture 2
Farm management principles and decision making: production function, technical relationships

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Farm Management Decisions:

The farm manager has to take decisions on several aspects for profitable operation of the farm. Decisions have to be taken regarding production, marketing and administration. These three segments are interlinked and decision making is also interlinked. In this lecture we shall look into the type of decisions that the farmer has to take and the micro-economics principles that could used for decision making.

1. Production decisions: Basically the farmer has to decide the following;

i. What to produce - The farmer has to decide the crops and allied enterprises that he wishes to produce in the farm. It depends on many factors like soil type, water availability, other resources that the farmer can mobilize, agro-climatic factors in the region and above all the needs of the market. Presently the emphasis is on market oriented agriculture. It would be more beneficial to the farmer if he produces the crop and variety preferred by the consumers, since he can sell them at a good price. Based o the above factors a farmer can narrow down the choice of crops and allied enterprises and then identify the optimum enterprise combination that would generate maximum net revenue.

ii. When to produce - The timing of release of output in the market is important since generally there is a glut in the market during harvest season and it leads to fall in price and eventually the low profit / loss to the farmer. Natural factors also influence the choice of cultivation of crops during a season.

iii. How to produce - The farmer has to decide the choice of technology for crop production. The farmer could go for organic farming or integrated approach using both organic and inorganic inputs. The choice and level of different inputs, the mode and timing of their application influence the yield.

iv. How much to produce - The area under a particular crop, size of poultry / livestock enterprise etc., influences the quantum of output. The size of enterprises directly influences the expenditure for cultivation and the farmers should be able to meet them from his own or borrowed resources.

In the case of perennial crops like fruit trees, the decisions have a long term impact on productivity and returns.

2. Managerial Decisions

Managerial decisions in a farm include human resource management (hiring and supervision of casual and permanent labour), utilization of funds, accounts and record maintenance, financial transactions, accessing information required for farm management etc.

3. Marketing Decisions

Marketing decision includes buying of inputs and selling of outputs. Buying decisions address the questions of when to buy? where to buy? how to buy? and how much to buy?. These decisions are important in determining the profitability of the farm business. Similarly the farmer is also confronted with the questions of when, where and how, to sell his produce? Marketing decisions play a crucial role in making the farm business a success or failure.

Production Function

In economics**, Function** is a mathematical equation that describes the relationship of a dependent variable to one or more independent variables. **Dependent variable** is a variable that is governed by another variable. e.g.: crop output (production). **Independent variables** are those variables whose value does not depend on other variable e.g.: labour, seed, fertilizer, land etc. Independent variables influence the dependent variable while dependent variables change values based on the changes of independent variables.

In regard to production, the dependent variable is the quantities of the product that is produced. The independent variable or variables are the resources committed to producing that product. In short, **output is the dependent variable while inputs or resources are the independent variables.**

- **Production function** is a function that describes the changes in the quantities of product produced due to changes in the resource or resources used in production.
- Thus**, the functional relationship between input and output is known as production function.**
- It shows the **maximum amount of production** that can be produced from a given set of inputs in the existing state of technology or the **minimum quantities of various inputs** required to produce a given quantity.

The **production function** can be expressed as under:

$$y = f(x_1, x_2, x_3, \ldots, x_n).$$

Where, y = quantity produced during a given period of time; x_1, x_2, x_3, ., x_n = quantities of different factors used in production.

OBJECTIVES

- **Production functions** are used in managerial economics to determine the most efficient combination of resources needed to produce a desire amount of products.
- **The production function explains how the output can be optimized.**
- As we increase the level of inputs, the output also increases. So, it is useful to know at which level of inputs, the **net returns** or the **profit is maximum**. This level is known as **optimum level** of input-use. Production Function helps to find out the optimum level of input-use.
- Thus, main objective of production function is **resource optimization**.

- It is very much useful in **decision-making** process of business management.

BASIC TERMS

Total Product (TP)	It is the **sum of output** which can be produced by using various units of inputs**.** It is denoted as **y**
Marginal Product (MP)	It is the **additional quantity of output**, added by an additional unit of input i.e., the change in output as a result of change in the variable input. $MP = \frac{\text{Change in Total Product}}{\text{Change in Input level}} = \frac{\Delta y}{\Delta x}$
Average Product (AP)	It refers to the **average productivity** of a resource. It is the ratio of total product to the total input used in producing that amount of product. $AP = \frac{\text{Total Product (TP)}}{\text{Total Input (x)}} = \frac{y}{x}$
Elasticity of Production (Ep)	It is defined as **percentage change** in output as a result of percentage change in input**.** It can also be defined as ratio of MP and AP. $Ep = \frac{\%\text{ change in Output}}{\%\text{ change in Input}}$ or $\frac{MP}{AP}$

Short-run and Long-run production functions

Short run is a period where some of the inputs are fixed. In the long run all the inputs are variable (no fixed inputs, the level of all inputs could be altered in this time frame). Therefore, production function in which some inputs are fixed is termed as short run production function and those input-output relations wherein all inputs could be varied is termed as long run production functions.

Technical relationships

Technical relationships could be analyzed in the short run and in the long run. Technical or production relationships in the short run could be grouped as;

- Factor - Product relationships
- Factor - Factor relationships
- Product - Product relationships

Factor - product relationships: This relationship is analyzed by applying various levels of an input (X_1) to a crop, while keeping all other inputs at a constant level, and examining its effect

on the output (Y). This process enables to determine how much of an input (optimum level) should be applied to get maximum yield.

Factor - Factor relationship: This is about combining two inputs which are used in crop production. The nutrient requirement for crops could be met by applying organic (FYM, vermicompost, enriched FYM) and inorganic fertilizers. It is essential to decide the least cost combination of two inputs that could be used for cultivating a crop to get a given level of yield. The two inputs considered in this case should be substitutable.

Product - Product relationship: The resources at the disposal of the farmer are limited and they have alternative uses. Given the level of resources, what are the crops/enterprises that he can raise and at what level? is an important decision. This relationship brings out the product mix or combination of enterprises that would maximize the revenue from the farm.

Long run

A technical or production relationship in the long run is called as returns to scale. In the long run all inputs become variable and none is fixed. Returns to scale explains the nature of output when all the inputs are changed by the same proportion. If output increases by that same proportional change (as that of the inputs) then it is termed as constant returns to scale. If output increases by less than the proportional change in inputs, then it is termed as decreasing returns to scale. If output increases by more than the proportional change in inputs, it is termed as increasing returns to scale.

Lecture 3
Farm management principles and decision making:
Cost Concepts, curves and functions ----------

Money cost or nominal cost is the total money expenses incurred by a firm in producing a commodity. It includes, cost of raw materials, wages and salaries of labour, expenditure on machinery and equipment, depreciation on machines, buildings and such other capital goods, interest, insurance, taxes, normal profit of the entrepreneur, etc

Real cost is a subjective concept. It expresses the pains and sacrifices involved in producing a commodity. Thus, the money paid for securing the factors of productions is money cost whereas the efforts and sacrifice made by the capitalists and workers in foregoing leisure constitute real costs

The opportunity cost of any good is the income of next best alternative good that is sacrificed. For example a farmer who is producing wheat can produce potatoes with the same factors. Therefore the opportunity cost of a quintal of wheat is the amount of output of potatoes given up.

Seven Cost Concepts

It is assumed that every business firm has a certain data regarding how they are producing various levels of outputs with the given prices of inputs and outputs. With this data, we can understand the relationship

between costs and output levels. Basically we require data on output, fixed costs, variable costs and prices of inputs and outputs. From this data we can finally derive all the seven cost concepts as under.

(1) Fixed Cost: Total Fixed Cost (TFC)

Costs which do not change in magnitude as the amount of output or production changes. Fixed cost has to be incurred even if the production is not taken. E.g. land taxes, interest, insurance premium, depreciation on capital investment, annual hired labour etc.

(2) Variable Cost: Total Variable Cost (TVC)

Costs which change in magnitude as the amount of output or production changes. Variable costs vary with the level of production. E.g. cost of seeds, fertilizers, irrigation and pesticides, cost of daily based labour, etc.

(3) Total Cost (TC) = TFC + TVC

$$\textbf{(4) Average Fixed Cost (AFC)} = \frac{TFC}{Y}$$

$$\textbf{(5) Average Variable Cost (AVC)} = \frac{TVC}{Y}$$

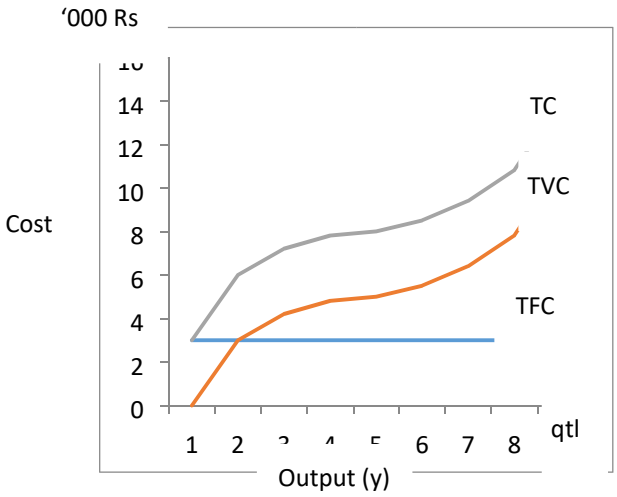
$$\textbf{(6) Average Total Cost (ATC)} = \frac{TC}{y}$$

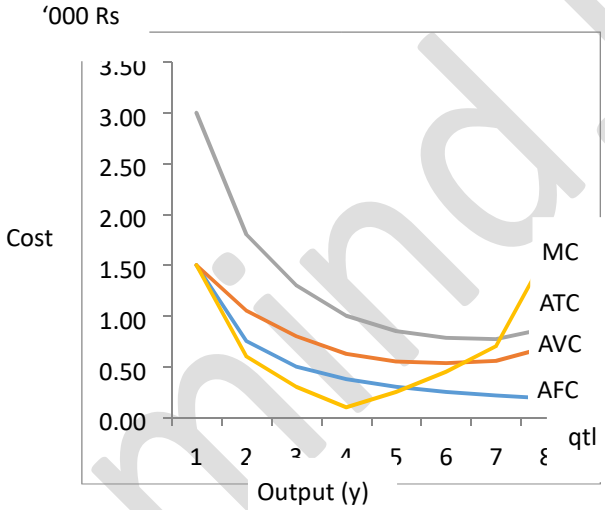
$$\textbf{(7) Marginal Cost (MC)} = \frac{\Delta TC}{\Delta y}$$

EXAMPLE

Cost in ` (thousand)

y (q)	TFC	TVC	TC=TFC + TVC	AFC= TFC/y	AVC= TVC/y	ATC= TC/y	ΔTC	Δy	MC= ΔTC/Δy
0	3	0	3	-	-	-	-	-	-
2	3	3	6	1.50	1.50	3.00	3.00	2.00	1.50
4	3	4.2	7.2	0.75	1.05	1.80	1.20	2.00	0.60
6	3	4.8	7.8	0.50	0.80	1.30	0.60	2.00	0.30
8	3	5	8	0.38	0.63	1.00	0.20	2.00	0.10
10	3	5.5	8.5	0.30	0.55	0.85	0.50	2.00	0.25
12	3	6.4	9.4	0.25	0.53	0.78	0.90	2.00	0.45
14	3	7.8	10.8	0.21	0.56	0.77	1.40	2.00	0.70
16	3	11	14	0.19	0.69	0.88	3.20	2.00	1.60





Nature and characteristics of AFC, AVC, ATC and MC

AFC: It is a fixed cost per unit. It varies with the level of output, as y increases, AFC decreases. So it always slopes downward. **AVC**: It varies with the level of output. AVC is decreasing first, attain minimum and then increasing.

The shape of AVC is "U" shaped.

ATC: It decreases as y increases, attain a minimum of AVC

MC: It is change in total cost in response to a unit increase in y. As y increases, MC decreases due to more efficient use of variable inputs, reaches a minimum and then slopes upwards.

Lecture 4

Farm management principles and decision making:

Factor-Product relationship- law of variable proportion ----------
----------Economic Principles Applied to Farm Management

1. **Law of variable proportions or Law of diminishing returns**: It solves the problems of how much to produce? It guides in the determination of optimum input to use and optimum output to produce. It explains the one of the basic production relationships viz., factor-product relationship.

2. **Cost Principle**: It explains how losses can be minimized during the periods of price adversity.

3. **Principle of factor substitution:** It solves the problem of 'how to produce? It guides in the determination of least cost combinations of resources. It explains factor-factor relationship.

4. **Principle of product substitution:** It solves the problem of 'what to produce'? It guides in the determination of optimum combination of enterprises (products). It explains Productproduct relationship.

5. **Principle of equi-marginal returns:** It guides in the allocation of resources under conditions of scarcity.

6. **Time comparison principle:** It guides in making investment decisions.

7. **Principle of comparative advantage:** It explains regional specialisation in the production of commodities.

Law Of Variable Proportion

- It examines the relationship between one variable factor and output, keeping the quantities of other factors fixed.
- Factor-Product Relationship is also known as Classical Production Function.
- It is a short-run production function.
- It also called as Law of Diminishing Marginal Return or Principle of Added Costs and Added Returns
- It is also called the Three Zones of Production Function.

DEFINITION

The Law of Variable Proportion states that as the proportion of one factor in a combination of factors is increased, after a point, first the marginal and then the average product of that factor will diminish.

PRODUCTION FUNCTION USED y = f (x1

| x2, x3,…, xn).

Where, y = output; x1 = variable input;

x2, x3,…., xn = fixed inputs.

OBJECTIVES

- The main objective of this relationship is to find out optimum level of resource use or resource optimization.

- The management problem associated with this analysis is how much to produce?

Example

Input (x)	Output (TP) (y)	Marginal Input (Δx)	Marginal Output (Δy)	AP (y/x)	MP (Δy/Δx)	Law of Returns
0	0	-	-	-	-	Increasing
1	2	1	2	2.0	2	
2	5	1	3	2.5	3	
3	9	1	4	3.0	4	
4	13	1	4	3.3	4	Constant
5	16	1	3	3.2	3	Decreasing
6	18	1	2	3.0	2	
7	19	1	1	2.7	1	
8	19	1	0	2.4	0	
9	18	1	-1	2.0	-1	Negative return
10	16	1	-2	1.6	-2	

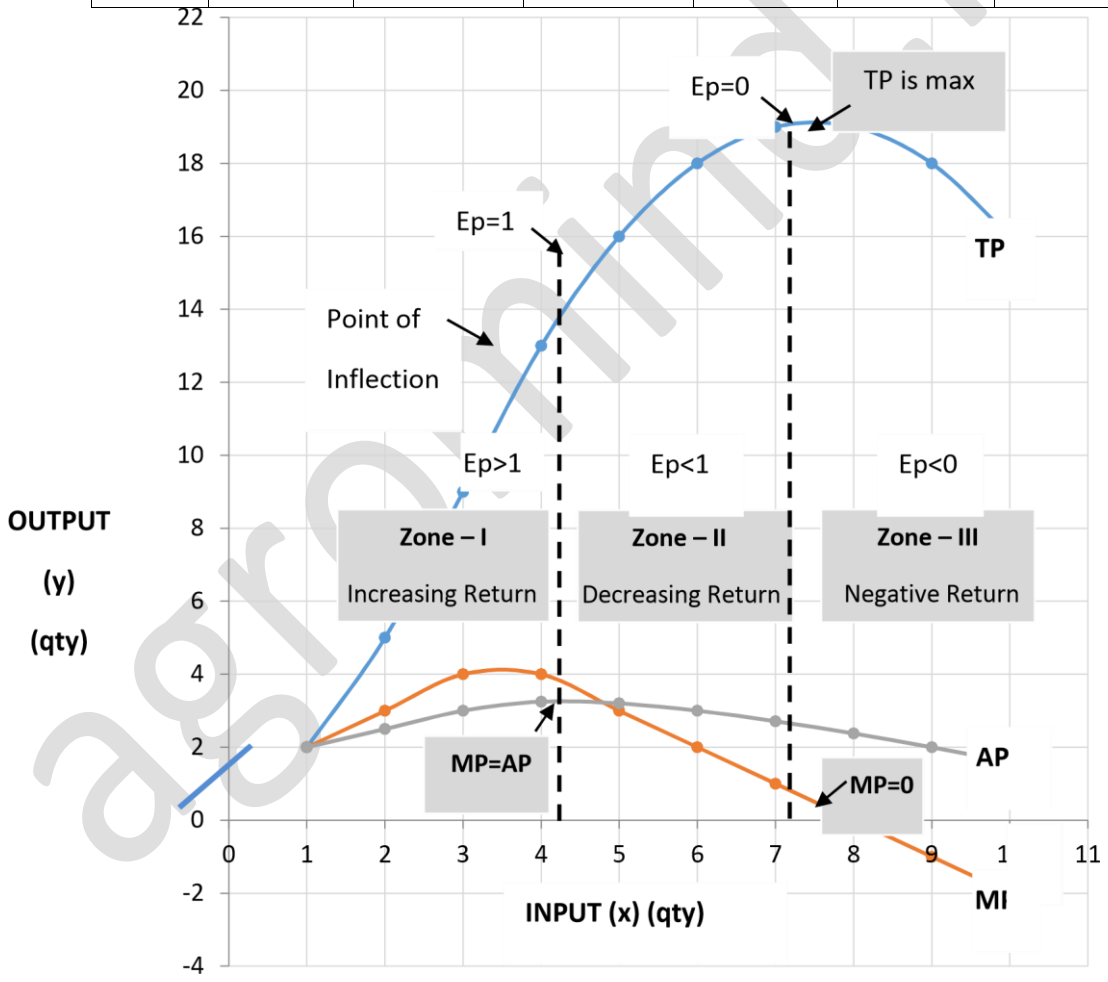


Fig.1: Classical Production Function

Nature of TP Curve	Nature of MP Curve	Nature of AP Curve
TP increasing at increasing rate TP increasing at decreasing rate TP riches at maximum and remains constant TP decreasing	• MP increasing • MP attains maximum • MP remains constant • MP decreasing	• AP increasing • AP attains maximum • AP is decreasing

Relationship between TP and MP When TP increasing at increasing rate, MP also increasing.

- When TP increasing at decreasing rate, MP also decreasing. When TP is maximum or remain constant, MP=0 When TP decreasing, MP becomes negative.
- When TP changes its curvature (from increasing rate to constant or decreasing rate), MP is maximum. This point is known as point of inflection.

Relationship between MP and TP	Relationship between MP and AP
• MP > 0, TP increasing • MP = 0, TP maximum • MP < 0, TP decreasing	When MP > AP, AP increasing; Ep >1 When MP = AP, AP is maximum; Ep=1 When MP < AP, AP decreasing; Ep<1

Three Zones Of Production Function

The classical production function can be divided into three zones.

Zone-I: Stage of increasing returns

- This region starts from the point of origin and ends where the average product reaches its highest (maximum) or where MP=AP.
- During this stage, the TP, AP and MP are increasing.
- It is notable that the MP in this stage increases but in a later part it starts declining. Though MP declining, it is greater than the AP.
- AP increases throughout this region indicating that the efficiency of all the variable inputs keeps on increasing.

Zone-II: Stage of decreasing returns

- This region starts where 1st zone ends. i.e. MP=AP and extends to the point where MP=0 or TP is maximum.
- In this zone, the TP continues to increase but at a diminishing rate.
- The MP and the AP are declining but are positive.

Zone-III: Stage of negative returns

- This region starts when MP crosses zero and becomes negative.
- In this zone the MP becomes negative.
- The TP and the AP are declining.

Rational / Irrational Zones

Zone-III

- This is a irrational zone because in this zone the TP is decreasing and MP becomes negative which indicates that additional quantities of inputs reduces the total output.
- So, it is not advisable to operate in this region even if the additional quantities of inputs are available free of cost.
- If a farmer operates in this zone, he will have double loss: i.) reduced production and ii) unnecessarily additional cost of inputs.
- For example, many farmers in canal area operate in this zone. They use excess water which ultimately reduces the profit.

Zone-I This is also irrational zone because, the AP increases throughout this zone indicating that the efficiency of all the variable inputs keeps on increasing. So, farmer should not stop in this zone and he must produce up to the level where AP is maximum.

- Input-use should be continued until zone-II. Hence, it is not reasonable to stop using an input when its efficiency is increasing. If he stops in this region, some of his resource will remain unused or underutilized.
- For example, most of the tribal farmers operate in this region because they don't have sufficient inputs. Zone-II

This is a rational zone.

- In this zone, TP is increasing; MP is decreasing but remains positive.
- Within the boundaries of this region is the area of economic relevance.
- Optimum use of input is somewhere in this zone which, however, can be located only when input and output prices are known.
- This zone represents the range of rational production decisions.

Summary

Zone - I	Zone - II	Zone - III
From origin to AP=MP	From AP=MP to MP=0	From MP=0 to onwards
TP, AP & MP all are increasing	TP is increasing but at a decreasing rate. MP & AP decreasing but are positive.	TP, AP & MP all are decreasing. MP becomes negative.
Ep > 1	Ep < 1	Ep < 0

Stage of increasing return	Stage of decreasing return	Stage of negative return
Irrational zone	Rational zone	Irrational zone
This Zone indicates underutilization of resource	This Zone includes optimum level of resource	This Zone indicates overutilization of resource

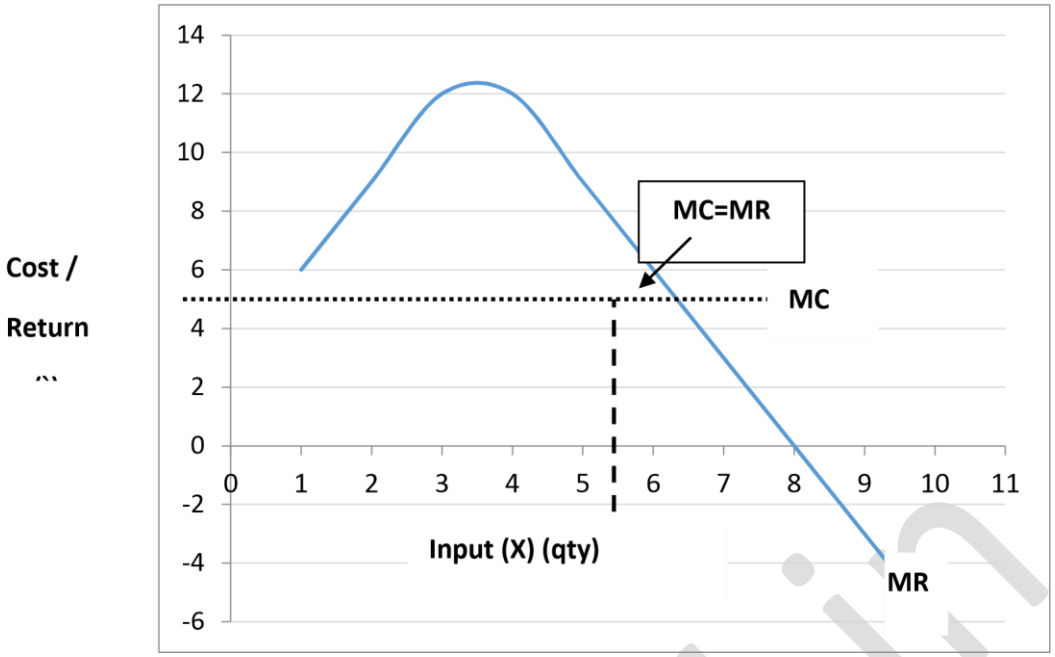
Resource Optimization

Optimum level of input use will be at the stage where the cost of additional input (MC) and the value of additional product (MR) are equal i.e., MC=MR. To calculate optimum level, data regarding price of input as well as output will be required.

Suppose, price of input is Rs.5/unit and price of output is Rs.3/unit.

Input (x)	Output (y)	Total Cost (`)	Total Income (`)	Net Return (`)	Marginal Cost (MC) (`)	Marginal Return (MR) (`)
0	0	0	0	0	-	-
1	2	5	6	1	5	6
2	5	10	15	5	5	9
3	9	15	27	12	5	12
4	13	20	39	19	5	12
5	16	25	48	23	5	9
6	18	30	54	24	5	6
7	19	35	57	22	5	3
8	19	40	57	17	5	0
9	18	45	54	9	5	-3
10	16	50	48	-2	5	-6

In this example, the optimum use of resource is at x=6, where MC=MR (nearest value). Exactly, it is somewhere between 6 and 7 unit which can be obtained through graphical method presented as under.



Applications

- The law is widely applicable to agriculture.
- Besides, agriculture, it also applies to mining, fisheries and also to building industries where the nature has supremacy.
- It is therefore, often remarked that the part that the nature plays in production corresponds to diminishing returns and the part which man plays conforms to the law of increasing returns.
- Thus, we can say that agriculture, where nature is supreme, is subject to diminishing returns, while industry, where man is supreme, is subject to increasing returns.

Reasons why agriculture is subject to the law of diminishing returns

1. Agricultural is related to nature. Man is not a complete master of nature. The operations are likely to be interrupted frequently by rain and other climatic changes.
2. The agricultural operations are spread out over a wide area, and consequently supervision cannot be very effective.
3. Scope for the use of specialized machinery is also very limited.
4. No scope for division of labour.

Reasons why industry is subject to the law of increasing returns

1. In case of manufacturing industries, man has the fullest scope to show his ability.
2. By the introduction of division of labour and the use of the most modern technology, production can be greatly increased.
3. Concentration of workers under one roof renders supervision easy and effective.

But, if the industry is expanded too much, supervision will become difficult and the costs will go up. In such situation, law of diminishing returns will set in. A prudent industrialist may not allow that stage to come at all. Hence, we can say that the law of diminishing returns has wide applications. In agriculture it sets in earlier, while in industry, it sets in a later stage.

Lecture 5

Farm management principles and decision making: principle of factor substitution and principle of product substitution

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Factor- factor relationship or principle of factor substitution

This economic principle explains one of the basic production relationships *viz*., factor-factor relationship. It guides in the determination of least cost combination of resources. It helps in making a manage means decision of how to produce.

Substitution of one input for another input occurs frequently in agricultural production. For example, one grain can be substituted for another or forage for grain in livestock ration, chemical fertilizers can be substituted for organic manure, machinery for labour, herbicides for mechanical cultivation etc. the farmer must select that combination of inputs or practices which will produce a given amount of output for the least cost.

In other words, the problem is to find the least cost combination of resources, as this will maximize profit from producing a given amount of output.

The principle of factor substitution says that go on adding a resource so long as the cost of resource being added is less than the saving in cost from the resource being replaced. Thus if input X1 is being increased, and input X2 is being replaced, increase the use of X1 so long as.

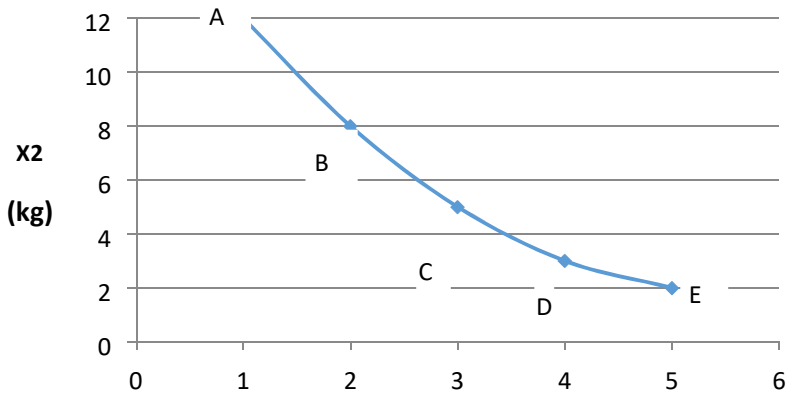
Statement of law:-

"if two or more factors employed in production process of a single product, cost is at minimum when ratio of factor prices is inversely equal to marginal rate of substitution."

Isoquant

Isoquant is the line connecting all combinations of two inputs that would produce the same level of output. Each point on an isoquants is the maximum output that can be achieved with these input combinations.

Combi-nation	Inputes	
	qty of Fertilizer (X1)	**qty of Manure** (X2)
A	1	12
B	2	8
C	3	5
D	4	3
E	5	2



X1 (kg)

Fig. Isoquant

Marginal rate of technical substitution (MRTS or MRS): MRTS is defined as the negative of the slope of the isoquant at any point. It is the rate at which two factors of production can be exchanged at a particular level of output and consequently that of the levels of inputs used.

$$MRS = \frac{\Delta X_1}{\Delta X_2}$$

Iso – cost Lines

An iso-cost line is the line connecting all combinations of two inputs that could be purchased for a given budget.

Suppose, a consumer has a fund of **Rs.** 270 which he wants to purchase on two inputs viz., Fertilizer (X1) and Manure (X2). The price of X1 is Rs **90/kg** and that of X2 is **Rs 30/kg**. Given the prices of X1 and X2, he can purchase a maximum 3 kg of Fertilizer or 9 kg of Manure. To draw **Budget line** we need two extreme points A and B on X and Y which can be obtained as under:

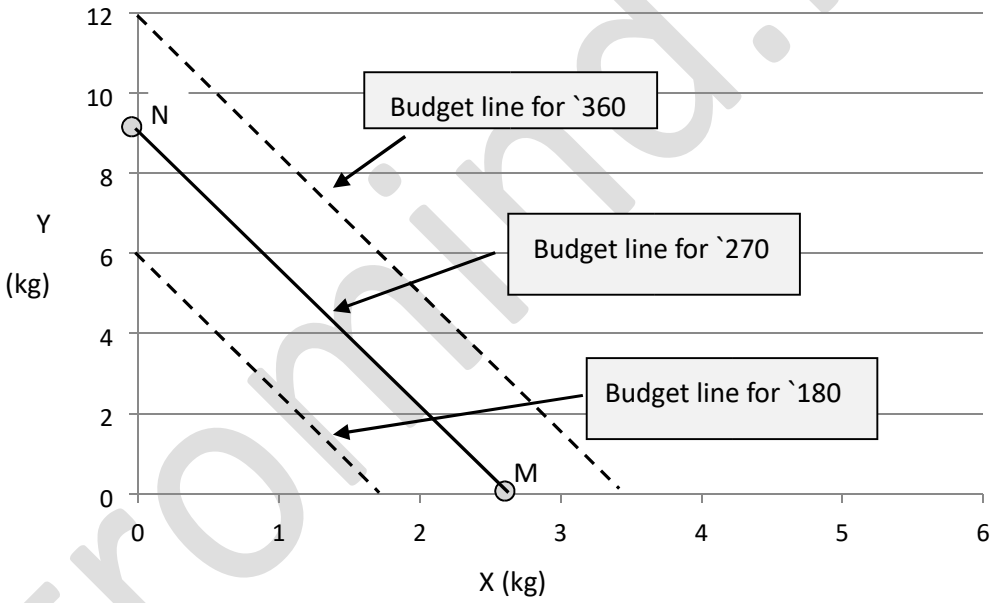


Fig. 5: Budget Line or Iso-Cost Line

Now according to law of factor substitution the the cost will be minimum or least cost combination is obtained when ratio of factor prices is inversely equal to marginal rate of substitution. The procedure to work out least cost combination as fallows

Step I :- work out Marginal rate of technical substitution (MRTS)

$$MRS = \frac{\Delta X_1}{\Delta X_2}$$

Step II :- work out price ratio

$$PR = \frac{PX_1}{PX_2}$$

Step II :- work out least cost combination by equating MRS and Price ratio

$$\frac{\Delta X_1}{\Delta X_2} = \frac{PX_2}{PX_1}$$

Suppose there are different combinations of two inputs viz. X1 and X2 used in production process. The price of X1 is Rs.6/- per unit and of X2 is Rs. 3/- per unit. The least cost combination is worked out as

Input combination	X_1	ΔX_1	X_2	ΔX_2	MRTS $\Delta X_1/\Delta X_2$	Cost of X_1	Cost of X_2	TC	PR PX_2/PX_1
A	1	--	12	--	--	6	36	42	0.5
B	2	1	8	4	0.25	12	24	36	0.5
C	3	1	5	3	0.33	18	15	33	0.5
D	**4**	**1**	**3**	**2**	**0.5**	**24**	**9**	**33**	**0.5**
E	5	1	2	1	1	30	6	36	0.5

The combination D having the least cost combination as its price ratio is inversely equal to MRTS **Profit or Decision rules:**

- If MRS > PR :- cost may reduced by using more of added resources.
- If MRS < PR :- cost may reduced by using more of replaced resources.
- If MRS = PR :- point of least cost combination.

Product – product relationship or Principle of Product Substitution

This principle explains the product-product relationship and helps in deciding the optimum combination of products. Also, this economic principle guides in making a decision of what to produce. It is economical to substitute one product for another product, if the decrease in returns from the product being replaced is less than the increase in returns from the product being added. The principle of product substitution says that we should go on increasing the output of a product so long as decrease in the returns from the product being replaced is less than the increase in the returns from the product being added.

Production possibility curve (PPC) or Iso-resource Curve

The Production Possibility Curve is a line connecting all combinations outputs of two enterprises or crops that can be produced using a given amount of input.

Marginal Rate of product substitution (MRPS)

MRPS is the rate of change in quantity of output of one enterprise (Y_1) as a result of unit increase in the output of the other enterprise (Y_2), for a given level of input (X). It is also known as Marginal Rate of Product Transformation (MRPT). So it is the slope of the PPC.

$$MRPS = \square Y_1/\square Y_2$$

Types of Product – Product relationship a.

Competitive products

Two products (or enterprises) are competitive when the output of one product can be increased only by reducing the output of the other product. Outputs are competitive because they require the

same inputs at the same time. If a farmer has a given level of water for irrigating bhendi and brinjal, he can either allocate equal share of water to both or more of water to bhendi and less to brinjal. Hence, these two products become competitive.

b. Complementary product

Two products (or enterprises) are complementary if an increase in output of one product (Y_1) also causes an increase in the output other product (Y_2) also, for the same level of inputs. PPC for complementary products have positive slope. Eg: Rotation of complimentary crop in cropping pattern. The by-products of one complementary enterprise (Y_1) will serve as input for production of the other product (Y_2).

c. Supplementary products

Two products are called supplementary if one product can be increased without increasing or decreasing the other product. These two enterprises are not interlinked. Eg: Farm yard Poultry and Crop cultivation.

d. Joint products

Products which result from the same production process are termed as joint products. No substitution among products is possible since joint products are produced in a fixed proportion. Eg: cotton lint and cotton seed.

According to the principle maximum profit are attained, when the marginal rate of product substitution is inversely equal to product price ratio.

$$\frac{\Delta Y_1}{\Delta Y_2} = \frac{PY_2}{PY_1}$$

Where ΔY1 = change in quantity of production of Y1

ΔY2 = change in quantity of production of Y2

PY1 = Price of Y1

PY2 = Price of Y2

Profit rules or Decision rules:

1. If MRS < PR, profits can be increased by producing more of added product.
2. MRS > PR, profits can be increased by producing more of replaced product.
3. Optimum combination of products is when MRS=PR

Lecture 6
Farm management principles and decision making:
Law of equi-marginal return, opportunity cost principle and principle of comparative advantage

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Law of Equi-marginal Returns

Most of the farmers have limited resources. They have limited land, limited capital, limited irrigation facilities. Even the labour which is considered to be surplus becomes scarce during peak sowing, weeding and harvesting periods. Under such resource limitations, farmers must decide how a limited amount of input should be allocated or divided among many possible uses or alternatives.

For example farmer has to decide on the best allocation of fertilizer between different crops and feed between different types of livestock. In addition, limited capital must be allocated to the purchase of fertilizers, seeds, feed etc.

The equi-marginal principle provides guidelines for the rational allocation of scare resources. The principle says that returns from the limited resources will be maximum if each unit of the resource should be used where it brings greatest marginal returns and not the average returns.

Statement of the law

A limited input should be allocated among alternative uses in such a way that the marginal value products of the last unit are equal in all its uses where it yields greatest marginal returns.

For an illustration of this principle, suppose a farmer has Rs. 5000; he can grow crops, raise dairy or poultry. His problem will be: What amount of capital he should invest on each enterprise to get highest profit. The problem is illustrated in following table.

Amount of capital used (Rs.)	Marginal returns (Rs.)		
	Crops	Dairy	Poultry
1000	2000	3200	2200
1000	1400	3000	1800
1000	1200	2500	1400
1000	1100	1600	1000
1000	1000	1200	800
Total returns from Rs. 5000/-	6600	11500	7200
Net profit	1600	6500	2200

Average returns will be the highest if the whole amount is spent on Dairy with gross returns at Rs. 6600/- and profits Rs. 1600/-. The marginal returns will, however, dictate spending of this money as under.

Amount	Enterprise	Added Returns
First Rs. 1000/-	Dairy	3200
Second Rs. 1000/-	Dairy	3000
Third Rs. 1000/-	Dairy	2500
Fourth Rs. 1000/-	Poultry	2200
Fifth Rs. 1000/-	Crop	2000
Total Returns from Rs. 5000/-	--	12900
Net Profit	--	7900

So this principle dictates that the resources should be used not where they brings the highest average returns, but where they yield the highest marginal returns. The best combination of enterprises is attained not when we select profitable crops, but when we select the most profitable crops. Budgeting or programming techniques take this principle into consideration for working out an optimum production plan.

Opportunity Cost

It is an economic concept closely related to the equi-marginal principle. Opportunity cost recognizes the fact that every input has an alternative use. Once an input is committed to a particular use, it is no longer available for any other alternative use and the income from the alternative must be foregone.

Definition: Opportunity cost is defined as the returns that are sacrificed from the next best alternative.
Opportunity cost is also known as **real cost or alternate cost.**

- Opportunity cost :- ***Opportunity cost is the value of next best alternative foregone.***

Suppose farmer having Rs 8000/- for investment for various purpose. He having following alternative options for investment.

1) Purchase of milk animal which gives him return of Rs 1000/- (i.e. 12% return on investment).

2) Purchase of water lift for his farm which gives the return of Rs 800/- (i.e. 10% return on investment).

3) Investment on implement which reduce the cost on hire implements gives returns of Rs. 600/- (i.e. 7.5% return on investment).

Among above options of investment First gives him more return rather than others.

Principle of Comparative Advantage

Certain crops can be grown in only limited areas because of specific soil and climatic requirements. However, even those crops and livestock enterprises which can be raised over a broad geographical area often have production concentrated in one region. Farmers in Punjab specialize in wheat production while farmers in Andhra Pradesh specialize in paddy production. These crops can be grown in each state.

Regional specialization in the production of agricultural commodities and other products can be explained by the principle of comparative advantage. While crops and livestock products can be raised over a broad geographical area, the yields, production costs, profits may be different in each area. It is relative yields. **Statement of the principle**

Individuals or regions will tend to specialize in the production of those commodities for which their resources give them a relative or comparative advantage. The following example illustrates the principle of comparative advantages. Costs and profits are important for the application of this principle.

Crop account per acre	Region A		Region B	
	Wheat	Groundnut	Wheat	Groundnut
Total Revenue (Rs.)	500	225	225	220
Total Cost (Rs.)	425	200	210	200
Net Returns (Rs.)	75	25	15	20
Returns per rupee	1.18	1.13	1.07	1.10

Region A has greater absolute advantage in growing both wheat and groundnut than Region B because the net incomes per acre are Rs. 75 and Rs. 25 respectively which are higher than the net incomes from wheat and groundnut in Region B.

Farmers of Region A can make more profits by growing both the crops. But they want to make the greatest profits and this can be done by having the largest possible acreage under wheat alone as it is the question of relative advantage. Similarly farmers of Region B have relative advantage in growing groundnut.

Lecture 7

Farm management principles and decision making:

Time comparison principle and economies of scale

Time Comparison Principle

Many farm decisions involve time. For example, a farmer has to decide between a cereal crop which would be harvested after about four months or an orchard which would start giving returns after three years.

Further, a farmer has to decide whether to purchase new farm machinery with 10 years of life or a second hand one which may have only five years of life. Several other decisions involving time and initial capital investment could be judiciously taken by compounding or discounting.

Future value of a present sum:

The future value of money refers to the value of an investment at a specified date in the future. This concept assumes that investment will earn interest which is reinvested at the end of each time period to also earn interest. The procedure for determining the future value of present sum is called **compounding.** The formula to find the future value of present sum

$$FV = P(1+i)^n$$

where,

FV = Future value;

P = the present sum,

i = the interest rate,

n = the number of years.

Example: Assume you have invested Rs. 100 in a savings account which earns 10% interest compounded annually and would like to know the future value of this investment after 4 years.

Year	Amount at beginning of year (Rs)	Interest rate (%)	Interest earned (Rs)	Amount at end of year (Rs)
1	100	10	10.00	110.00
2	110	10	11.00	121.00
3	121	10	12.10	133.10
4	133	10	13.31	146.41

Present value of future sum: ❑ Present value of future sum refers to the current value of sum of money to be received in the future. The procedure to find the present value of future sum is called **discounting.**

❑ The discounting is done because sum to be received in the future is worth somewhat less now because of the time difference assuming positive interest rate. The equation for finding the present value of future sum is

$$PV = \frac{P}{(1+i)^n}$$

where,

PV = Present value

P = Future sum

i = rate of interest

n = number of years.

Example:

Find the present value of Rs. 1000/- to be received in 5 years using an interest rate of 8%.

Laws of returns to scale

The Laws of Returns to Scale is about the long run production analysis, wherein all inputs used in production are variable. The term returns to scale refers to the changes in output as all factors of production are increased by the same proportion.

When all factors are increased by the same proportion;

i. The output may increase by the same proportion, then it is called Constant returns to scale. ii. If the output increases less than proportionately, then it is called Decreasing returns to scale. iii. If the output increases more than proportionately, then it is called Increasing returns to scale. Return to scale: ***It refers to the change in out put as a result of a given proportionate change in all factors of production simultaneously.***

When all the factors of production involved in production process are increased or decreased simultaneously, in a certain fixed proportion, the response of output to such increase or decrease in the input level is explained through the concept of return to scale.

Labour	Capital	Total output (qtls)	Increment in output	Nature of return to scale
0	0	0	--	Increasing
1	1	8	8	
2	2	17	9	
3	3	28	11	
4	4	38	10	Constant
5	5	48	10	
6	6	58	10	
7	7	68	10	
8	8	76	8	Decreasing
9	9	82	6	
10	10	86	4	

Difference between Law of variable proportion and return to scale

SN	Law of Variable Proportion	Return to Scale
1	Describe the behavior of output when one input is varied	Examine the behavior of output when all inputs are varied at same time.
2	Some factors of production are constant.	All factors are varied.
3	The proportion among factors varies.	The proportion among factors remains same.
4	It is a short run production function.	It is a long run production function.
5	Here increasing, constant and decreasing returns to a factor are observed.	Here increasing, constant and decreasing return to scale observed.
6	It is a reality.	It is a myth.

Lecture 8 Cost of cultivation and Breakeven analysis

----------**Cost of Cultivation: Cost of Cultivation:**

"The expenditure incurred on all input and input services in raising a crop on an unit area, is referred as cost of cultivation."

e.g. Cost in Rs./ha. **Cost of Production:**

"The expenditure incurred on all input and input services in producing a unit quantity of output is referred as cost of production."

e.g. Cost in Rs./qtl.

The cost concepts used in the present analysis are those laid down in the farm management study.

Cost-A: The following items are included in cost-A

i. Cost of hired human labour,
ii. Cost of hired and owned bullock labour,
iii. Tractor charges,
iv. Cost of seeds,
v. Cost of manures (owned and purchased),
vi. Cost of fertilizers,
vii. Cost of plant protection chemicals,
viii. Irrigation charges,
ix. Depreciation
x. Interest on working capital
xi. Other paid out expenses

Cost A can be divided into two parts viz., Cost A_1 and Cost A_2, if tenant farmers are there in the study. But in the present study, Cost A was considered without dividing into cost A_1 and Cost A_2 as there was no tenant farmer in the list of selected respondents. The expenses incurred towards land revenue, transport charges, charges to contract work etc., were included under the head of other paid out expenses.

Cost- B:

Cost-A + Imputed rental value of owned land + Imputed interest on owned fixed capital (excluding land).

Cost- C_1:

Cost- B + Imputed value of family labour. **Cost- C_2:**

Cost- C_1 + 10 per cent of cost– C_1 (as managerial charges.) **Cost of Production per Quintal:**

(Total Cost - Value of by-product) / Yield

Imputation Procedure for Owned Inputs

The value of purchased inputs was recorded as reported by the farmers after its verification, while some of the inputs used in the production process came from the family resources. In computing the cost of cultivation, it is necessary to compute value of these owned inputs. The procedures used for the computation of values are indicated below.

i. Family labour was valued at the rate of casual labour prevailing for different operations in the sample villages.
ii. Owned bullock labour was valued at the prevailing marketing rate.
iii. The value of farm produced manure and seeds were computed at the market price. iv. The cost of irrigation and tractor was considered at the prevailing market rate.
v. Interest on working capital was charged at the rate of 12 per cent per annum for the duration of the crop.
vi. Depreciation on buildings used for the storage purpose was calculated at the rate of 5 per cent on Kachcha and 2 per cent on Pakka buildings.
vii. Rental value of farmers owned land was charged at the prevailing rate in the villages.
viii. Interest on owned fixed capital was calculated at the rate of 10 per cent per annum. ix. Management charge was taken as 10 per cent of the Cost-C_1.

Income Measures

The various income measures used in the present study are shown as under.

(i) Value of Gross Output (Gross Income): It is calculated by adding the income obtained from main product and income obtained from by-product.

(ii) Farm Business Income = Gross Income minus Cost- A

(iii) Family Labour Income = Gross Income minus Cost- B **(iv) Farm Investment Income**

Farm Business Income – Imputed Value of Family Labour (or) Net Income + rental value of owned land + Interest on owned fixed Capital. **(v) Net Income (profit or loss)**

Value of gross output minus Cost- C_2

Input-output ratio

Input-output ratio over different costs = Gross income / cost

Break even analysis

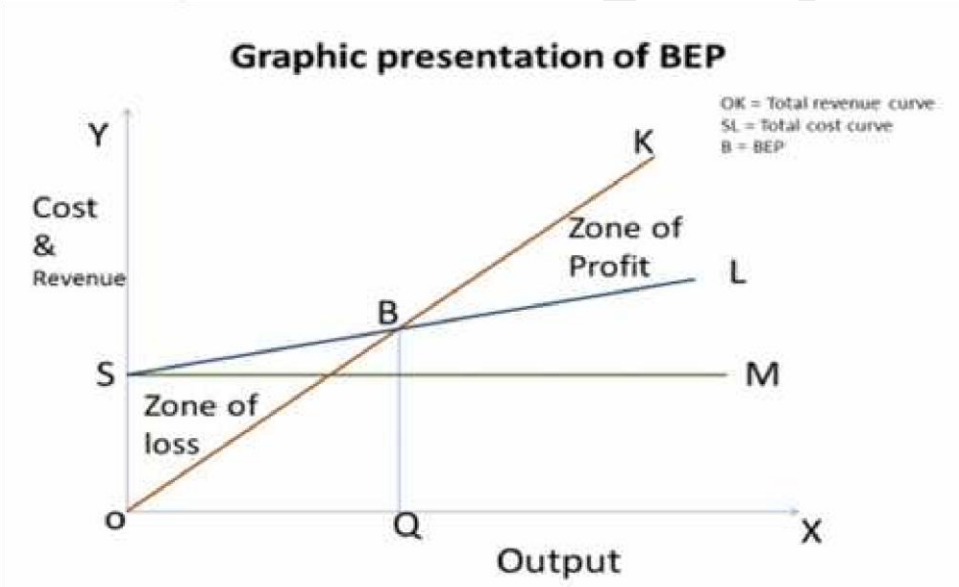
Break even analysis is a technique used to assess the level of output at which the farmer realizes no loss or no profit. The level of output at which the total cost is equal to total returns. **Break even point (BEP):**

'the point at which two curves i.e. total cost curve and total revenue curve intersect is called as break even point.'

- BEP indicate the level of production at which the producer neither losses money nor makes profit.
- The region below BEP is zone of Loss and the region above BEP is Zone of profit.
- Break Even Analysis indicate cost- volume – profit relation in short run.

The BEP can be estimated mathematically or with a graph. The data on total cost (TC) and total return (TR) for various levels of output have to be drawn in a graph and the point of intersection of the TC with TR is the break even point.

Fig. Total Cost, Total Returns and Break Even Point



Break-even formula

Algebraically BEP calculated as:

$$BEP = \frac{\text{Fixed cost per ha.}}{\text{Price per qtl of output} - \text{variable cost per qtl}}$$

$$BEP = \frac{F}{P - V}$$

Break Even Analysis	
Particular	Value
Fixed cost/ha (Rs)	**12000**
Variable cost/ha (Rs)	20000
Total Cost/ha (Rs)	32000

Price per quintal (Rs)	**300**
Output/ha (Qtls)	150
Total Revenue/ha (Rs)	45000
Variable Cost/quintal (Rs)	**133.33**
BEP quantity (Qtls)	71.99

Theory Notes of

Course No. :SSC- 6.8
Course Title: Horti-Business management Credits: 2 (2 + 0)

Lecture 9

Decision making under Risk and Uncertainty

Definition

Risk: It is situation in which when all possible outcomes and the probabilities associated with these outcomes are known for a given management decision.

Uncertainty : it is the situation when all possible outcome and probabilities associated with these outcome are not known for a given management decision.

Risk is situation in which one knows both the possible future outcomes of a production process and the probability associated with each outcome. Uncertainty is a situation in which either the possible future outcomes are unknown or the probabilities of outcomes are unknown or both.

Types of uncertainty in Agriculture:

a. Price uncertainty: Prices of products / inputs are not known to the farmers with certainty.
b. Yield uncertainty: Farmers may not able to predict the yield of crops with certainty because of weather conditions, incidence of pests and disease, etc.
c. Technological uncertainty: farmers may not be aware of the exact impact of new technology on the quantity and quality of yield.
d. Institutional uncertainty: Conditions of tenure, functioning of credit agencies are examples for institutional uncertainties.

Steps against Risk and uncertainty i. Diversification

Diversification means growing two or more crops or allied enterprises to avoid the yield and price uncertainty of depending on a single crop or enterprise. Eg; diversification with crop and livestock is very common.

ii. Insurance

Farmers can insure their crops against losses due to storm, fire or pests and diseases. In India, Agriculture Insurance Company of India Limited (AIC) incorporated in 2002 offers yield-based and weather-based crop insurance programs in almost 500 districts of India. The premium is subsidized for farmers who own less than two hectares of land. This insurance follows the area approach.

iii. Flexibility

Flexibility means the provisions in a farm plan to transfer resources from one enterprise to another enterprise without difficulty in order to gain larger profit. Transfer of resources become necessary because of anticipated losses in one enterprise or an anticipated rise in profit in another enterprise or both. **iv. Contracts**

Contracts are made with input supplying agencies or for selling farm products to safeguard against fluctuations in prices.

v) Use of improved agronomic practices and technologies vi) Use of market intelligence to avoid market risk

Lecture 10

Farming : Types & Systems

Farming is classified on the basis of

a) Crop and livestock raising
b) the mode of economic and social functioning

Based on above factors farming classified as 1) Types of farming
2) Systems of farming.

Types of Farming

Meaning: Type of farming refers to the nature and degree of product or a combination of products being produced at the farm and the methods and practices used for the same. It refers to the production pattern of farm enterprises as determined by the physical condition of the farm and resources of the farmer. It further shows how crop and livestock enterprises and farming practices are distributed among farms and localities. It is the classification of farming on the basis of crop and livestock enterprises taken by the farmer (i.e. based on extent of crops grown).

According to it farming having types as

1) Specialized farming
2) Diversified farming
3) Mixed farming
4) ranching
5) Dry farming

Types of farming are as follow:

(1) Specialized Farming:

A specialized farm is one on which 50% or more receipts are derived from one source. It may consider specialization as the production of only one commodity for market so that the farmer depends on a single source of income. According to this a farm on which 50% or more of the receipts are from sugarcane would be classified as sugarcane farm.

Advantages of specialized farming:

1. Better use of land.
2. Better marketing.
3. Better management.
4. Less equipment and labour are needed.
5. Costly and efficient machinery can be kept.
6. Efficiency and skill are increased.**Disadvantages of specialized farming:**

1. Productive resources are not fully utilized.
2. There is a great risk.
3. Fertility of soil cannot be maintained for lack of suitable crop rotation.
4. By-products of the farm cannot be fully utilized for lack of sufficient livestock on the farm.
5. Farm returns in cash are not generally received more than once a year.

(2) Diversified Farming:

A farm on which no single product or source of income equals as much as 50% of the total receipt is called diversified farming. On such a farm, the farmer depends on several sources of income.

Advantages:

1. Better use of land, labour and capital.
2. Business risk is reduced due to a crop failure.
3. Regular and quick returns are obtained.

Disadvantages:

(1) Marketing is insufficient unless the producer arrange for the sale of their produce.
(2) Better equipping of the farm is not possible.

(3) Farmer cannot effectively supervise number of workers.

(3) Mixed Farming:

It is a crop production combined with livestock raising. The livestock enterprise is complementary to crop production programme so as to provide a balanced and productive system of farming. The farm to be categorized as of the mixed type, in which at least 10 to 49% of its gross income must be contributed by the livestock activities. Bullock were not considered as part of the livestock enterprise. Mixed farming to combination of crops and their complementary livestock enterprises would largely comprise milch cattle and buffaloes. Mixed farming as to include in the combination possible supplementary enterprises like sheep, goats, fishery and poultry must be classified under diversified farming.

Advantages:

(1) Milch animal provide drought animals for crop production and rural transport.
(2) Maintenance the soil fertility.
(3) It tends to give a balanced labour load throughout the year for the farmer and his family.
(4) It permits proper use of the farm by-products.
(5) It provides greater chances for intensive cultivation.
(6) It offers higher returns on farm business.

(4) Dry Farming:

A precarious tract receives 50 cm. or less of annual rainfall struggle for livelihood. The major farm management problem in these tracts, where crops entirely dependent upon rainfall, is the conservation of soil moisture.

Dry Land Agriculture: Growing of crop entirely under rainfed condition known as dry land agriculture. It categorized as

a) ***Dry Farming :*** Cultivation of crop in area which receives rainfall less than 750 mm per annum. Crop failure is most common problem in it.
b) ***Dry land farming:*** Cultivation of crop in area which receives rainfall more than 750 mm per annum. Crop failure is less frequent.
c) ***Rainfed farming:*** Cultivation of crop in area which receives rainfall more than 1150 mm per annum. Crop failure is rare but drainage problem is more frequent.

Dry farming involves the adoption of the following practices:

(1) Timely preparation of land for conserving the available moisture.
(2) Improving the water holding capacity and texture of the soil by profitable application of organic manures.
(3) Use capable implement of rapidly breaking up the surface of the soil after rains. **Recommendations for Dry farming:**

1. Use of soil turning plough once in a three years in clay and loam soils.
2. Sloppy places should be bunded into small leveled field.
3. Use small seed rate/hectare
4. Use 6-8 cart loads of manure every year.
5. 4-5 hoeing before hoeing before sowing in rainy season and crop sown in line.

(5) Ranching:

The livestock graze the natural vegetation. Ranch land is not utilized by tilling or raising crops. The ranchers have no land of their own and make use of the public grazing land. A ranch occupies most of the time of one or more operator. e.g. sheep rearing.

(6) Mechanized Farming:

When farm operations are carried out through farm mechanization on large scale and work is done through relatively more farm mechanization practices as compared to labour, the farming is called mechanized farming.

Advantages: (Favour)

1. It helps in increasing yield through more timely and effective farm operations.
2. Possibility of multiple cropping is increased by speedy harvesting and land preparation for the sowing of next crop.
3. It supplements human labour when there is shortage of labour during seasons.
4. It reduces dependence on draught animals which have relatively high cost.

5. It increases the productivity of human labour which is very low in agriculture.

Disadvantages: (against)

(1) It causes unemployment in the labour force.
(2) The amount of cattle dung provided by draught cattle will be reduced, which is essential as manures.
(3) It may create social tension between the large landlords and small farmers.

System of Farming:

Meaning

System of farming generally concerned with the organizational setup under which farm is being run. System mainly involves the questions like who is the owner of the land. It refers to the farming methods and type of ownership of resources that are brought into effect under single or joint management. It shows how products and expenses are shared under joint cultivation.

Farming classified on the basis of mode of social and economical functioning are the systems of farming i.e. based on the ownership of land.. Farming classified as 1) Co-operative farming.
2) Collective farming.
3) capitalist farming.4) State farming
5) Peasant farming.

Systems of farming are as follow:

(1) Peasant Farming:

Peasant farming is concerned with peasant's relation to land. The zamindari Abolition Acts of state Government have given the right of ownership to practically all the peasant operators in the country. This farming has given them opportunities to organize and operate their farms in their own way and get due reward for their labour and capital. Peasant farming encourages them to maintain and develop the fertility and productivity of their soil resulting from the security in the occupation of land with social prestige attached to the ownership.

(2) State Farming:

The farms are managed by government officials. The agricultural labourers are paid wages on weekly or monthly basis in accordance with the wages fixed under Minimum Wages Act.

(3) Capitalistic Farming:

The capitalistic farming is based on the capital provided by the ownership of the farm in carrying out farm operations, as mill owners or sugarcane factories.

(4) Co-operative Farming:

Co-operative farming means a system under which all agricultural operations or part of them are carried on jointly by the farmers on a voluntary basis, each farmer retaining right in his own land. The farmer pool their land, labour and cultivates the land jointly under the direction of an elected management. A part of the profit distributed in proportion to the land contributed by each farmer and the rest of the profit contributed in proportion to the wages earned by each farmer**. Types of Co-operative farming:**

a) co-operative Better Farming
b) co-operative Joint farming
c) co-operative Tenant farming
d) co-operative collective farming

a) Co-operative Better farming: in it land is not pooled and cultivation is carried out by each farmer separately. Here ownership and operation ship are individual.

b) Co-operative Joint farming: in it land of member is pooled for joint cultivation. Here ownership is individual and operation ship is collective. The member work on land under a guidance of committee and get wages for that purpose.

c) Co-operative tenant farming: in it land is of society and divided into small plots and leased out to members for individual cultivation. Here ownership is collective and operation ship is individual. The society arrange for agricultural input and guidance.

d) Co-operative collective farming: in it land is owned by the society and cultivation done jointly. Here ownership and operation ship is collective. The profit is paid to the members in proportion of work and capital contributed by each member.

(5) Collective Farming:

The ownership of land belongs to society or may be transferred to it. The land is cultivated jointly. Such societies are generally organized on waste land or newly reclaimed land. The members work together under the management committee elected by themselves. The committee directs farm management in the matter of allocation of work, distribution of income and marketing surpluses and puts all members into labour to see that the work is done efficiently.

Lecture 11

Business management, functions of management and planning

- Management is defined as the process by which a cooperative group directs action towards common goals. **Joseph Massie**
- To manage is to forecast and to plan, to organize, to command, to co-ordinate and to control. **HenryFayol**
- Management is a multipurpose organ that manages a business and manages managers and manages worker and work. **Peter F. Drucker**
- **Management is the process of designing and maintaining an environment in which individuals, working together in groups, accomplish their aims effectively and efficiently. Harold Koontz and Heinz Wiehrich Business Management**

As stated earlier, management has wide range of applications, when applied to managing business firms it is referred to as business management. So, business management refers to the application of management principles and functions for effectively and efficiently operating business firms to achieve the goals of these firms.

In Horti-business management, the focus is on management of horticulture farms / orchards / plantations / nurseries etc. As any firm, the simple objective is to maximize returns from the farm or enterprise so as to meet the needs of the farm family. Since farming is their livelihood, they have to ensure sustainable returns so that they have a decent standard of living for a long period of time. The farmer uses resources available in the farm and also purchases some resources (Chemical fertilizers etc) from the market based on requirement.

He also engages hired labour and available farm family members who are willing to work in the farm. Usually the owner farmer is in charge of production, marketing financial and human resource management, the major departments in a farm / firm.

Functions of Management

Functions of Management refer to the key roles that are performed in any organization for the smooth functioning of the organization to achieve the goals of the organization. Though there are several views about the roles of management, the most common are Planning, Organizing, Staffing, Directing and Controlling (Koontz and O'Donnell).

a. Planning: It is the process of selection of objectives of the firm and deciding the course of action to achieve them. It is about preparing the long term goals and short term targets and deciding the best course of action among various available alternatives so as to achieve the goals of the firm.

b. Organizing: It is the process of identification and grouping of activities and assigning tasks and authority and responsibility to enable employees to accomplish organization objectives. Farming involves lot of activities to be done in a sequence at times the role of skilled labour would be required for efficient operations. Though the farmer, in majority farms is the overall manager, he may also delegate some of the work like supervisory work to family members.

c. Staffing: It is the process of manpower planning, recruiting employees for various positions in the organization and training them to achieve the objectives of the organization and offering reasonable remuneration for their services. It involves assessing labour requirements, permanent and casual, depending on the size of the farm and arranging for labour for various operations in the farm.

d. Directing / Leading: It is the process of communicating, motivating and supervising people so as to achieve the organizational goals. It involves effectively and efficiently using human resources by empowering and encouraging them for achieving the goals of the firm.

e. Controlling: It is the process of monitoring the progress of an organization for achieving its objectives**.** Plans are based on assumptions and they have to be executed properly. Plans may require midterm corrections depending on the situation, hence the implementation process has to be closely monitored to avoid loss and attain the targets.

Planning

Planning: ***'it is choosing future course of action form amongst the alternatives for organization as a whole or department within it.'***

Scientific Planning: **Scientific planning is systematic and written based on the best information available and aimed at achieving the maximum satisfaction for the farmers and his family out of their resources.**

Farm plan: **Total farm activities of farm drawn up in advance called as farm plan.**

- A farm plan should show the enterprises to be taken up on the farm; the practices to be followed in their production, use of labour, investments to be made and similar other details
- Farm planning enables the farmer to achieve his objectives (Profit maximization or cost minimization) in a more organized manner.
- It also helps in the analysis of existing resources and their allocation for achieving higher resource use efficiency, farm income and farm family welfare. Farm planning is an approach which introduces desirable changes in farm organization and operation and makes a farm viable unit.

Type of Farm Plans

A) Based on time period

1) ***Short term / annual planning*****:** planning done for a season or year.

2) ***Long run Planning:*** planning covering the period of time of 5-10 years or more.

B) Based on size of enterprise

1. Simple farm planning: It is adopted either for a part of the land or for one enterprise or to substitute one resource to another. This is very simple and easy to implement. The process of change should always begin with these simple plans.

2. Complete or whole farm planning: This is the planning for the whole farm. This planning is adopted when major changes are contemplated in the existing organization of farm business.

Advantages of farm planning:

- Income improvement
- Educational process
- Desirable organizational changes
- Determination of needed adjustment
- Formulation of development projects
- Way of farm security

- Yard stick of agril. credit

Characteristics of Good farm plan

1. It is should be written.
2. It should be flexible.
3. It should provide for efficient use of resources.
4. Farm plan should have balanced combination of enterprises. Such combination in turn ensures,
    a. Production of food, cash and fodder crops.
    b. Maintain soil fertility.
    c. Increase in income.
    d. Improve distribution of and use of labour, power and water requirementthroughout the year.
5. Avoid excessive risks.
6. Utilize farmer's knowledge and experience and take account of his likes and dislikes.
7. Provide for efficient marketing.
8. Provision for borrowing, using and repayment of credit.
9. Provide for the use of latest technology.

Step in Farm Planning

In developing an optimum farm plan with the budgeting technique, the following steps are generally followed.

1 Specification of the technical co-efficient of production

Farm planner should compile all relevant information from various sources to learn some of the improved farming method and practices and the various input output factors which can be applied to the local conditions. This entails specifying the requirements of each resource in producing each product. This kind of information must be obtained from specialist in various field of agriculture. The main sources of relevant information are 1 research trial 2 trial and demonstrations on cultivators field 3 cropcutting experiments 4 farm management surveys 5 farmers own trials and practical experience and 6 information recorded by extension workers.

2 Specification of appropriate price

In planning ahead, one can never be sure of the prices that will obtain for different products. One simple prediction model that can be used is to assume prices next year will be same as they are this year. As an alternative, we might take the average of the last three years. Price will need to be specified keeping in view the last years' average prices, future expectation, and nature of changing technology etc.

3 Preparation of enterprise profitability chart

Having decided the enterprises, what prices and input-output coefficient to use as basis for planning, one will have to evaluate the alternative opportunities and to select those opportunities which make the best use of farmers' resources. The help of enterprise budgets profitability ranking chart is prepared on the basis of net return figure of all the possible enterprise.

4 Preparation of the farm map

Prepare farm map depicting all the physical features such as soil types, topographical features, drainage, road, water channel, source of irrigation etc.

5 Inventory of limited resources

Prepare a complete list of the farm resources which limit the size of the different farm enterprise; such as land, labour, animals, buildings, machinery and liquid capital etc. This helps assessment of resource limitations and production capabilities of the farm. To these resources, possibilities of hiring or borrowing are added. These restrictions lay down a framework, within which a farm plan is considered.

6 Examine the existing farm plan

Obtain full information on how each resource is being utilized and what are the outputs obtained from various enterprises adopted on the farm. In other words, examine the present plan followed by the cultivator, for its cost and returns and resource use pattern:

(a) Work out the variable cost such as hired labour, seed water charge, fertilizers, etc. for each enterprise.

(b) Work out the gross income from various enterprises by multiplying physical yields time price per unit of the commodities.

(c) Work out the returns to fixed farm resources in respect of each enterprise through deducting variable cost from the gross income.

With the help of these returns to the fixed farm resources from various crop enterprises, the total returns to the fixed farm resources from the existing plan of the farmer are analyze the resources-use pattern based on existing plan of the cultivator as well.

7 Locate the weakness of the present plan

Careful analysis of the resources-use in the existing plan will throw up the imbalances. The various weaknesses in the existing plan act as guide line for bringing about improvements in the alternative plan.

8 List out the risks to agricultural production on that farm

Make a list of all such risks involved in the agricultural production on that particular farm and bear them in mind in developing the alternative plan. To the extent possible, provide for effective steps for eliminating or reducing risks.

9 Prepare the alternative plans

There are number of alternative plan suiting the situation of the farmer. Within the framework of resource restrictions and keeping in view the weakness of the existing plan and the possibilities of incorporating modern technology, a few alternative farm plans may be developed. alternative farm plans can be worked out which may vary in the amount of risk involved, labour requirement and other features as well as probable net income.

10 Analysis of the alternative plan

Check the plan to be within resource restrictions. Ideally we should evaluate alternative plan on various points such as probable income, amount of risk involved, labour and capital requirements, etc. The farmer should select the plan for his farm which he feels will give him and his family the highest level of satisfaction in respect of these and other variable.

11 Implementing the plan

The farm planning does not end with the preparation and selection of the final plan for adoption. The most important phase is its proper execution. They may be certain difficulties in implementing the plan, unless all the problems are properly anticipated. Plan for example, may call for an application of mixed fertilizers. If this is not available or if the farmer does not have the credit to purchase it, he cannot follow the plan. For this reason a good plan will usually provide flexibility which makes its possible to alter the plan as new problems arise.

Limitations of farm planning:

- Time consuming and expensive device.
- Unavailability of relevant farm records.
- Information related to climate, water supply, marketing not found in required form.

Lecture 12

Organization: forms or types of business organization

To attain the ultimate objectives the efforts are required to be channelized appropriately. Therefore the subsequent step in management process after planning is to organize the activities of enterprises for the fulfillment of objectives. The word organization is used basically in two contexts.

1) Referring to a particular company or group of person working together.

2) Referring to the organization as a structure.

Defination:

The process of identifying and grouping the work to be performed, defining and delegating responsibility and authority, establishing relationship for the purpose of enabling people to work most effectively together in accomplishing the objectives – Louis A Allen.

Organization is a process of defining and grouping the activities of the enterprises and establishing authority relationship among them. – He Hainmen

Forms of business organization

- ❖ Individual enterprise or individual proprietorship
- ❖ Partnership
- ❖ Joint stock company
- ❖ Cooperative enterprise
- ❖ State or public & Govt. enterprises

1) Individual enterprise or individual proprietorship

The common forms of business organization in India is one man business in agriculture and retail business by his own capital. The owner of business organize and supervise the business and he alone responsible for result, get profit or loss. The firm is called by the name of entrepreneurs or by name of god.

Advantages:

- ❑ No interference of other person in business.
- ❑ Capital requirement is less
- ❑ Such type of business is more flexible.
- ❑ Direct contact with customers, therefore instant feedback received. ❑ It is easy to start and terminate.

Disadvantages:

- ❑ Limited capital for business.
- ❑ Unlimited liabilities.
- ❑ Growth of business depends on entrepreneurs knowledge, skill and attitude. ***2) Partnership:***

It is the form of business organization in which two or more but less than twenty partners jointly own an enterprise and agree to share the profit in a pre- determined portion. Every partner contribute his own capital and profit distributed according to their respective capital contribution.

Advantages :

- Greater financial resources
- Diverse talent
- Strong management
- Risk in business shared by partners ▪ This business can dissolve easily.

Disdvantages :

- Unlimited liability
- Dishonesty of partner may spoil business
- Limited profit
- Splitting of business due to disagreement on a particular decision.
- Death of partner causes dissolve of business legaly.

3) ***Joint – Stock Company:***

It is known as corporate (corporation) form of business. A JS company is an association of individuals as shareholders who are authorized by the government to run a particular business. A limited company is organize in the way, the cooperation of at least six or more persons.

The draft the memorandum of associated which contain the name
of company,
the location of head quarter, it's
aims and objective
the amount of the share of capital,
kinds and value of share and declaration of that liability is limited rules and regulation of the company.

-- The policy making job is done by the Board of Directors.

-- e.g. TATA, Birla, Bajaj, Reliance etc.

Types of JS Company:

1) **Joint stock private limited company.**
-- minimum numbers of members 2 and maximum 50.
-- 'Pvt. Ltd. Must be use in name of company 2)

Joint stock public limited company.
-- Minimum member 7 and no limit for maximum members. -
- e.g. RCF Ltd.

Advantages:

- Efficient management
- Limited liability
- Less risk to shareholder
- Democratic management

- Large capital ***Disadvantages:***
- Concentration of economic power
- Delay in decision making
- Excessive state regulation ▪ Problem in formation of company ***4) Co-operative enterprises:***

The co-operation implies the self help made effective through mutual help. It based on "all for each and each for all" The basic objective behind cooperatives to protect weaker section of society for fulfill their needs

Co-operative is broadly three types

i) **Producers co-operative :** milk, sugar co-operative, taluka kharidvechan sang etc. ii) **Consumer's co-operative :** consumer's stores, consumer's co-operative fruit and vegetables society, consumer Co-operative petrol pump etc.

iii) Credit co-oprative : PACS

Advantages:

- Membership open to every person
- Democratic management
- Moto of cooperatives is service not profit ***5) State enterprise:***

The government or local body like municipal or zilapanchayat or Agro industries runs business. This is done by generally in the case of public utility services like water supply, electric power supply, city bus by municipal corporation, state transport corporation agriculture product supply by agro industries, telephone, postal, railways and banking services under the control by central government.

Organizational Principle Functions (Functions of Entrepreneur) :

There are several important functions in organizations as under.

- **Conceiving &Initiating:** It is the entrepreneur who conceives the plant of a business; he put into execution &starts the business.
- **Organizing:** First of all he must make the financial arrangement, tackle the practical part of the problem he must buy machinery and get it installed, he must hire labour & assign them suitable job, he must purchase raw material & organize each process of manufacture & market the product.
- **Directing &Supervision:** He direct the production in to most profitable channel. He supervises work for maximum profits.
- **Control:** He must control work of business.
- **Risk taking:** He must responsible profit or loss in business. He has final responsibility of risk.
- **Innovation:** He takes decision on new technical innovation. In short organizer or entrepreneur initiates, organize, direct & supervise and control the undertake risk of the business and introduce innovation.

Steps in organization or process of organization:

1) Identifying activities involved in achieving objectives.
2) Grouping the activities
3) Defining responsibility and accountability
4) Delegation of requisite authority
5) Provision of adequate physical facilities.

6) Establishment of clear structural relationship among individuals and groups.

Lecture 13

Organization: principles of organization and divisions of labour

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Organizing Principles

The organizing process can be done efficiently if the managers have certain guidelines so that they can take decisions and can act. To organize in an effective manner, the following principles of organization can be used by a manager.

1. Principle of Specialization

- According to the principle, the whole work of a concern should be divided amongst the subordinates on the basis of qualifications, abilities and skills.
- It is through division of work specialization can be achieved which results in effective organization.

2. Principle of Functional Definition

- According to this principle, all the functions in a concern should be completely and clearly defined to the managers and subordinates.
- This can be done by clearly defining the duties, responsibilities, authority and relationships of people towards each other.

3. Principles of Span of Control/Supervision • According to this principle, span of control is a span of supervision which depicts the number of employees that can be handled and controlled effectively by a single manager. *According to this principle, a manager should be able to handle what number of employees under him should be decided.

4. Principle of Scalar Chain• Scalar chain is a chain of command or authority which flows from top to bottom. With a chain of authority available, wastages of resources are minimized,

- Communication is affected, overlapping of work is avoided and easy organization takes place.
- A scalar chain of command facilitates work flow in an organization which helps in achievement of effective results.

5. Principle of Unity of Command

- It implies one subordinate-one superior relationship.
- Every subordinate is answerable and accountable to one boss at one time.
- This helps in avoiding communication gaps and feedback and response is prompt. Unity of command also helps in effective combination of resources, that is, physical, financial resources which helps in easy co- ordination and ,therefore, effective organization.

Remaining principles of organization

- Principle of simplicity
- Principle of Authority
- Principle of personal ability
- Principle of objectives
- Principle of Delegation
- Principle of Responsibility
- Principle of Efficiency ➢ Principle of Flexibility
- Principle of Balance
- Principle of Exception

Division of Labour:

When many people combine to produce an article, the work so arrange that the making of the article is split up in to a number of process. Each process is then assigned to a separate set of people. This specialization is known in Economics as Division of labour.

Following are three division of labour

1) Simple Division Labour : Labour divided according to occupation or trade

e.g. farmers, shopkeepers, carpenters, weavers etc. this is simple division of labour on he basis of occupations.

2) Complex Division of Labour : This means Division according to tasks of complete process. For example making of cloth divided into process of spinning, sizing, weaving, bleaching, finishing etc. A number of process is carried out by separate group of people. It may be called Complex Division. ***3) Territorial Division of Labour :*** This is also known as localization of industries as per supply of available raw material

e.g. certain place or region comes to specialization in making certain article. For example Hosiery industry at Ludhiana, Cotton textile at Ahmadabad& Bombay, Jute Industry at Calcutta, Lather industry at Kanpur.

Power and Authority

Authority	Power
It rest on the chain or position with the change in the position authority of individual is also changes.	It rest on the individual, even if position has changed, his power remain unchanged.
It is delegated to an individual by his supervisor.	It is earned by an individual through his own efforts. The individual gets it from people below him or from his peers.
It is mostly well defined conspicuous and finite in commensurate with responsibility.	It is undefined, inconspicuous and infinite. Its location cannot be known from the formal organization chart.
It is what exists in the eyes of the law.	It serves as basis of informal organization.
It serves as a basis of formal.	

Delegation	Decentralization
It means assignments of duties, authority and accountability for the performance of duties.	The decision making authority is vested in the hands of one or few people in organization.
It refers relationship between two individual ie. A superior and his immediate subordinates	It refers to relationship between the top management and various departments and divisions in the enterprise.

Lecture 14

Direction and co-ordination

Directing is concerned with telling subordinates what to do? and ensuring that they do it "as best as they can do." It including assigning tasks & duties' explaining procedures, issuing orders, providing on the job instruction, monitoring performance and correcting deviations. i.e. Turning point

The directing functions include following.

1) Supervising.
2) Guiding.3) Leading.
4) Motivating.
5) Communication.6) Co-ordination.

1) Supervising:-

- The aim of supervision is to ensure that sub-ordinates work efficiently to accomplish the tasks assign them.

- Directing & Supervising are similar in the sense that both seek to motivate the sub-ordinate staff and provide leadership so that the pre determinate goals are effectively accomplished.
- The supervisory staff deals with workers who are engaged in basic operations.

Qualities of a good supervisor:

- Knowledge about the organization.
- Technical competency.
- Ability to instruct and explain the work.
- Ability to listen to others together in formation, to solve the problems, to share experience etc.
- Ability to secure co-operation.
- Ability to orderly thinking.
- Ability to judge people.
- Ability to patience.
- Ability to improve worker's morale/self confidence.
- Ability to enforce discipline.
- Ability to delegate the work among his subordinates according to their capabilities.

2) **Guiding:-**

- This refers to a specialized task of leading the sub-ordinates to accomplish the result by overcoming the hurdles.
- Direction and purpose are very important for a manger to guide his sub-ordinates.

3) Leading :-

- Leading means a person who takes the responsibility of the work to do the work for groups target by them.
- **Leader:-**
- Leader is able to gain co-operation of the members in achieving the object or goal: Where ever there is a group of people, there is a leader, co-operative society chairman & Board of Management, Panchayat, Panchayat level Sarpanch etc. • **Leadership:**

  Leadership is the matter of influencing people in group to co-operate toward same goal, which they find desirable to them.
- Allen defined: leader as one who guiding and directs other people. He must give effective direction & purpose. **Primary functions of leader:**
- Executive/managerial.
- Planner.
- Policymaker.
- Expert.
- External group representative.

- Controller of internal relations.
- Conveyor of reward and punishment & Mediator.

Qualities of leadership:

- Health and physical fitness.
- Mental vigor and energy.
- Courage to accept responsibility.
- Steady & persistent.
- Sound general education.
- Management ability i.e. art of handling men.
- Sense of judgment power.
- Understanding or empathy.
- Motivation to others.
- Communicating skill. ***4) Motivation:-***
- Motivation also refers to expansion on his mental and physical efforts to accomplish the given task.
- Motivation refers to goal directed behavior.
- It means what a person will choose to do when several alternatives are available to him.
- It also refers to the strength of his behavior after he has exercised the choice, and the persistence with which he will engage in such behavior.
- Financial rewards: Bonus, Holiday payment, Overtime, Profit sharing, Fringe benefits ie. Facilities at concession rate amenities etc.
- Non-Financial Rewards: Servant at home, free conveyance facility, furnished free accommodation.
-

5)Communicating

Communication means sharing ideas in common goal. It means a verbal or written message, an exchange of information, a system of commutating, and a process by which meaning are exchanged between individuals through a common system of. It also means a technique for expressing ideas effectively.

Elements of communication process:

- A communicate who sends message.
- Message or information should be communicated.
- Encoding i.e. putting the message in suitable words.
- Transmission of message.
- Receiver or respondent or audience.
- Decoding i.e. understanding the message.
- Response i.e. reaction of the respondent by way of reply, action or use of message.

Two types of communication, i.e. 1. Formal 2. Informal

Three types of direction of communication may be as 1. Oral 2. Written 3. Gesture.

6)Co-ordination

Its aim to secure co-operation and team work among the employees engaged in the work organization. Negatively, its removal of conflicts, working at cross purpose and over-lapping duplicate work in administration. Co-ordination is the first principle of organization and includes within itself all other principles which are sub-ordinate to it and through which it operate.

Lecture 15

Controlling: System, types and devices

Control means the power or authority to direct and order or restrain.

- Controlling defined as "***Comparing the operating results with the plans, and taking corrective action when results deviate from the plans."*** **Need for control:**
- Measure progress.
- Uncover deviation.
- Taking corrective action.

System of controlling or Steps in control process:

Controlling as a management function involves following steps:

1. **Establishment of standards-** Standards are the plans or the targets which have to be achieved in the course of business function. They can also be called as the criterions for judging the performance. Standards generally are classified into two-
   a. Measurable or tangible – Those standards which can be measured and expressed are called as measurable standards. They can be in form of cost, output, expenditure, time, profit, etc.
   b. Non-measurable or intangible- There are standards which cannot be measured monetarily. For example- performance of a manager, deviation of workers, their attitudes towards a concern. These are called as intangible standards.

   Controlling becomes easy through establishment of these standards because controlling is exercised on the basis of these standards.

- Different standards used in control process
- Physical standards: e.g. Labour hours per unit of output or level of production / machine / hours.
- Cost Standards: e.g. Direct or indirect cost / unit, material cost / unit, selling cost / unit.
- Revenue standards: e.g. Average sale / Customer sales / capital in market area.
- Capital standards: e.g. Rate of return on capital invested current asset / current liabilities.
- Intangible standards: e.g. Rules, laws or methods achievement results.

2. **Measurement of performance**- The second major step in controlling is to measure the performance. Finding out deviations becomes easy through measuring the actual performance. Performance levels are sometimes easy to measure and sometimes difficult. Measurement of tangible standards is easy as it can be expressed in units, cost, money terms, etc. Quantitative

measurement becomes difficult when performance of manager has to be measured. Performance of a manager cannot be measured in quantities. It can be measured only by-

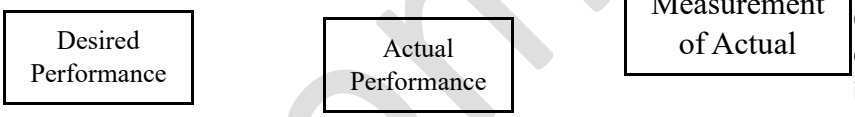
a. Attitude of the workers,
b. Their morale to work,
c. The development in the attitudes regarding the physical environment, and
d. Their communication with the superiors.

It is also sometimes done through various reports like weekly, monthly, quarterly, yearly reports.

3. **Comparison of actual and standard performance**- Comparison of actual performance with the planned targets is very important. Deviation can be defined as the gap between actual performance and the planned targets. The manager has to find out two things here- extent of deviation and cause of deviation. Extent of deviation means that the manager has to find out whether the deviation is positive or negative or whether the actual performance is in conformity with the planned performance. The managers have to exercise control by exception. He has to find out those deviations which are critical and important for business. Minor deviations have to be ignored. Major deviations like replacement of machinery, appointment of workers, quality of raw material, rate of profits, etc. should be looked upon consciously. Therefore it is said, " If a manager controls everything, he ends up controlling nothing." For example, if stationery charges increase by a minor 5 to 10%, it can be called as a minor deviation. On the other hand, if monthly production decreases continuously, it is called as major deviation.

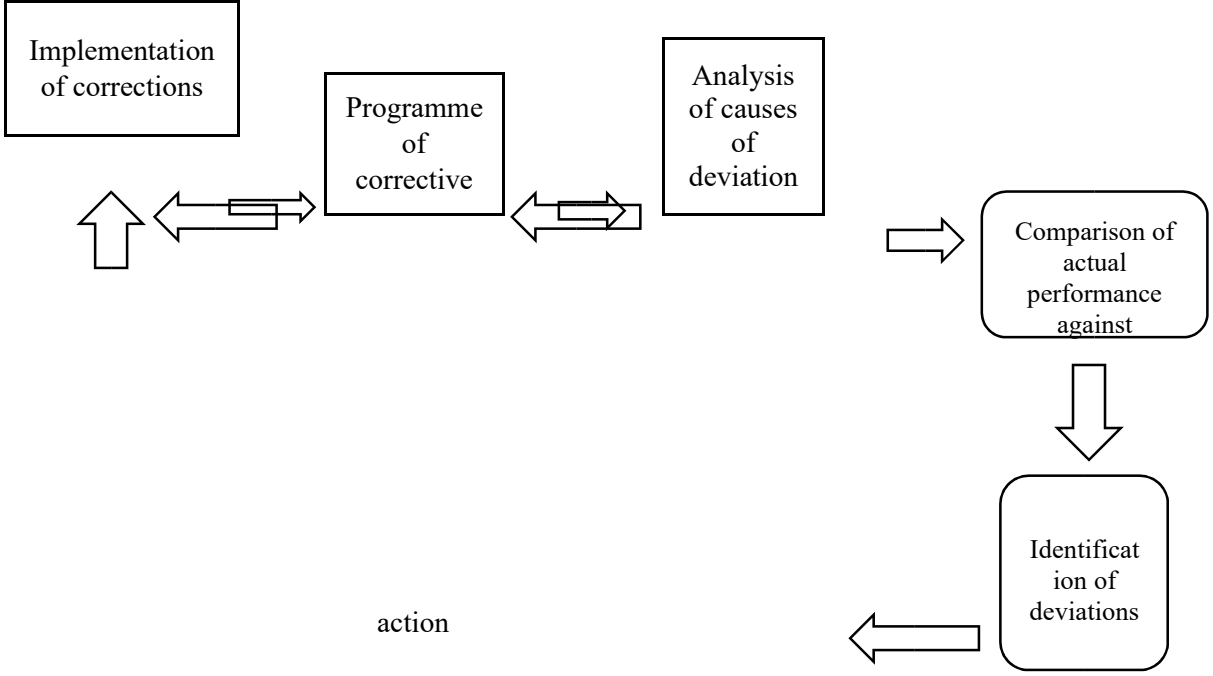
   Once the deviation is identified, a manager has to think about various cause which has led to deviation. The causes can be-

   a. Erroneous planning,
   b. Co-ordination loosens,
   c. Implementation of plans is defective, and
   d. Supervision and communication is ineffective, etc.
   e. inadequate and poor equipment and machinery, inadequate communication system,
   f. lack of motivation of subordinates,
   g. selection of personal
   h. defective system of remuneration etc.

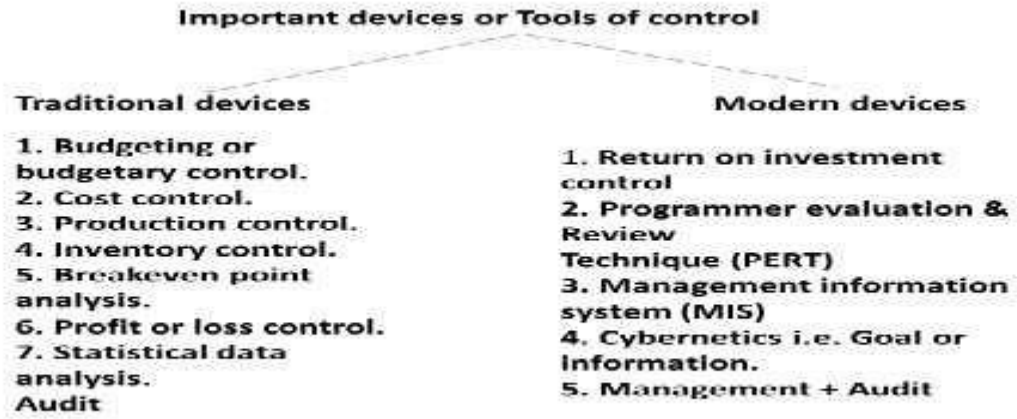


4. **Taking remedial actions-** Once the causes and extent of deviations are known, the manager has to detect those errors and take remedial measures for it. There are two alternatives here-
   a. Taking corrective measures for deviations which have occurred; and

After taking the corrective measures, if the actual performance is not in conformity with plans, the manager can revise the targets. It is here the controlling process comes to an end. Follow up is an important step because it is only through taking corrective measures, a manager can exercise controlling. Relationship between planning and controlling



Important devices or Tools of control



Types of control

a. Levels of Management

Level of management	Type of control
Top	Strategic
Middle	Tactical
Junior	Operational

b. Direct or Preventive

c. Control in functional areas

1. Quality control

2. Financial control (Budget / expenditure)
3. Inventory control
4. Production control (efficiency / cost)

Lecture 16

Controlling: Budgeting and record keeping as tool of control

FARM BUDGETING

Farm budgeting is a method of analyzing plan for the use of agricultural resources at the command of decision maker. A farm plan is a programme of the total farm activities drawn up in advance. The expression of farm plan in monetary terms by estimation of receipts, expenses and net income is called as budgeting.
In the other word, farm budgeting is a process of estimating costs, returns and net profit of the farm or a particular enterprise.

Types of farm budgets

1. Enterprise budget

- An enterprise is defined as a single crop or livestock commodity being produced on the farm.
- An enterprise budget is an estimate of all income and expenses associated with a specific enterprise and estimate of its profitability. Enterprise budget can be developed for each actual and potential enterprise in a farm plan such as paddy enterprise, wheat enterprise or a cow enterprise.
- Each is developed on the basis of small common unit such as one acre or one hectare for crops or one head for livestock. This permits easier comparison of the profit for alternative and competing enterprises.
- Enterprise budget can be organized and presented in three sections income, variable costs and fixed costs.
- The first step in developing an enterprise is to estimate the total production and expected output price. The estimated yield should be an average yield expected under normal weather conditions given the soil type and input levels to be used.
- The output price should be the manager's best estimate of the average price expected during the next year or next several years. Variable costs are estimated by knowing the quantities of inputs to be used (such as seed, fertilizer, labour, manures) and their prices. The fixed costs in a crop

enterprise budget are depreciation on machinery, equipment, implements, livestock, farm building etc., rental value of land, land revenue, interest on fixed capital.

Example: Enterprise budget for paddy production (one hectare)

I) Income

48 quintals @ Rs. 600 per quintal 28,800

II) Variable Costs

1. Human labour	9,000
a) Owned	3,000
b) Hired	6,000
2. Bullock labour	300
a) Owned	100
b) Hired	200
3. Tractor power	4,000
a) Owned	1,000
b) Hired	3,000
4. Seeds	1,200
5. F.Y.M.	1,800
6. Green leaf manures	700
7. Fertilizers	3,000
8. Plant protection chemicals	500
9. Irrigation charges	500
10. Interest on working capital	1,700
Total variable costs	**22,700**

III) Fixed Cost

1. Land revenue	12						
2. Depreciation	900						
3. Rent on owned land	3,500	4. Interest on fixed capital	450	Total fixed costs	4,862	**Total costs**	**27,562**
Gross margin (TR - TVC)	**6,100**	**Profit (TR-TC)**	**1,238**				

2 . Partial budget: Is the method of making a comparative study of costs and returns analysis resulting from a change in a part of the farm business organization. It refers to the estimating outcome or returns for a part of the business i.e. one or a few activities

Example: Improved method of mango cultivation versus local method of mango cultivation.

It is used to calculate the expected change in profit for a proposed change in the farm business. Partial budget is best adapted to analysing relatively small change in the whole farm plan. Changes in the farm plan or organization adapted to analysis by use of partial budget are of three types.

1. Enterprise substitution: This includes a complete or partial substitution of one enterprise for another. For example, substitution of sunflower for groundnut.
2. Input substitution: Example: Machinery for labour, changing livestock rations, owning a machine instead of hiring, increasing or decreasing fertilizers or chemicals.

3. Size or scale of operation: This includes changing in total size of the farm business or in the size of the single enterprise, buying or renting of additional land, expanding or decreasing an enterprise

The format for partial budget.

Debit	**Credit**
a. Increase in cost Rs. _____	a. Decrease in costs Rs. _____
b. Decrease in returns Rs. _____	b. Increase in returns Rs. _____
Total (a + b) Rs._____	Total (a + b) Rs. _____

(Credit - Debit) = Net gain or loss

Example: A farmer want to take intercropping in mango plantation. Prepare a partial budget by using following information

	Only mango plantation	mango with intercropping
Expenses for planting	20000	23000
Other operating cost	2000	2500 Gross
income	65000	72000

Solution:

Debit	Credit
a. Increase in cost Rs. 3500	c. Decrease in costs Rs. 00
b. Decrease in returns Rs. 00	d. Increase in returns Rs. 7000
Total (a + b) Rs. 3500	Total (a + b) Rs. 7000

(Credit - Debit) = Net gain = 7000 – 3500 = 3500

Result: intercropping in mango plantation is beneficial which gives net gain of Rs. 3500/- per ha

FARM RECORD KEEPING AS A TOOL OF CONTROL

Farm record keeping is an important tool of farm business analysis. Farm records gives the history of business transaction. It is also known as

Farm accountancy or

Farm Records and Accounts

Objective : to provide control over the business and improve the management of the farm.

Farm Accountancy:

it is the art as wel as science of recording in books the business transactions in a regular and systematic manner, so that their nature, extent and financial effects can be readily ascertained at any time of the year.

Farm record keeping helps the farmer

- To check performance of different enterprises.
- Which enterprise returning most over the capital investment.
- To guide future decisions.
- Whether to go for specialisation or diversification.
- Useful in preparing plan.

Advantages

- Means of higher income
- Basis of diagnosis and planning.
- Improve managerial ability of farmer.
- Basis of credit acquisition and management.
- Guide to better management and future decisions.
- Basis of research.
- Basis of policy formulation ***Limitations of farm record keeping in India***
- Subsistence nature of farming
- Triple role of Indian farmer as farm manager, farm labour and family head.
- Illiteracy
- Lack of business awareness.
- Complicated nature of agri business
- Inadequate extension services.
- Non availability of suitable farm records books
- Fear of taxation.

Types of farm records

1) Physical farm records
2) Financial farm records
3) Supplementary farm records.

Theory Notes of

Course No. :SSC- 6.8
Course Title: Horti-Business management
Credits: 2 (2 + 0)

Lecture 17

Functional area of management: Operational management

In any business organization, the commonly identified functional areas are production, marketing and finance. In recent years, the personnel and material that go into the production process, packing process and marketing process have gained importance and given importance by treating them separately as personnel and material management.

Organization functional areas are as under: •

Production/Operation management

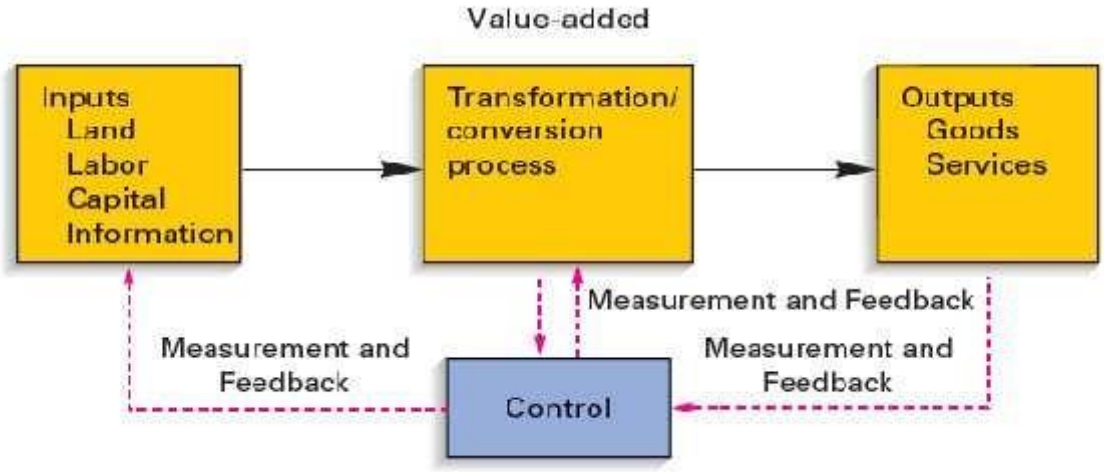
- Marketing management
- Financial management
- Personnel management
- Material management

Operation Management

An operation is that part of a business organization that is responsible for producing goods and/ or services. Goods are physical items that include raw materials, parts, subassemblies such as motherboards that go into computers, and final products such as cell phones and automobiles. Services are activities that provide some combination of time, location, form, or psychological value.

Operation/Production management: Production management refers to planning, organization, direction, co-ordination and control of production function carried out in such a way that the desired goods or services could be produced at the right time in right quantity and at optimum cost.

E.S. Buffa defines production management as, *"Production management deals with decision making related to production processes so that the resulting goods or services are produced according to specifications, in the amount and by the schedule demanded and out of minimum cost."*



Production management decisions:

a) What to produce ?
b) When to produce ?
c) How much to produce ?
d) How to produce ?
e) Deciding whether to by or make ?

f) Deciding to specialize or generalize ?

Deciding whether to Buy or make or lease

- Convert raw material into final product need more time and process. Need to concentrate on specific.

One of the fundamental issues facing every producer is the make, buy, or lease decision: whether to manufacture a needed product or component, to purchase it from an outside supplier, or to lease it. Factors affecting the make, buy, or lease decision include the costs of leasing or purchasing parts from outside suppliers as compared with the cost of producing them in-house;

The availability of outside suppliers and dependability of their shipments in the quality and quantity needed; the need for confidentiality; and whether the need for the commodity in question is short or long term.

Deciding to specialized or generalize

A food processor may

- Grow or buy his fruit requirements
- Sell his output to a wholesaler, retailer, or direct to consumer

Activities in Operation management

- Developing the product / service.
- Establishment of proper organization structure.
- Selection of personnel.
- Establishment and maintenance of factory building, plant and equipment machinery.
- Management of purchase, storage and transportation of raw material.
- Ensuring effective control.

Lecture 18

Functional area of management: Physical facilities

Physical Facilities

Physical facilities: The physical facilities of the firm would include building, machinery and equipment's, furniture and fixtures and others. They must be designed to aid employment in producing the desired product or services at a low cost. The design function includes layout, selection of machines and equipment and determination of features desired in planning.

Steps in planning Physical Facilities:

1. Determine goods and services to be produced and performed.
2. Break the product or services into parts, operations and activities. Parts are the divisions of the product that when assembled from output Some out put have only one part while other may have many. Operations are the steps or segments of work performed to accomplish the conversion of input into output. Eg Tillage, sowing, weeding, fertilizer application, irrigation,
3. Determine the time to perform different operation
4. Estimate the number of machine and worker need
5. Decide the best arrangement for the sequences of operations

– There are Three types (1) Product or service layout (2) Processor or function lay out and (3) Fixed position layout

1) Product or service layout

The product layout places machine or serving units in such a way that the product moves along a line as it passes through the sequence of operation.

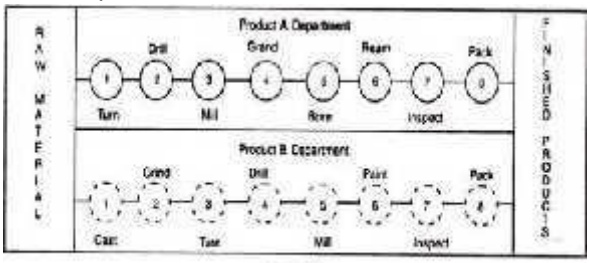


Fig. 8.3.

Advantages

- Specialization of workers and machine
- Less inventory
- Fewer instruction and control
- Faster movement

2) **Process layout**: The Process layout is based on keeping machine and workers busy so that idle time is reduced to a minimum.

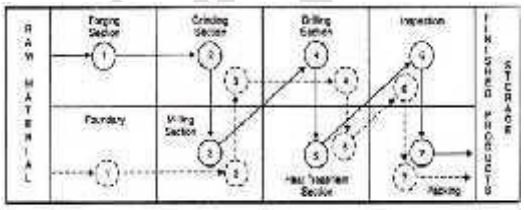


Fig. 8.4.

Advantages

- It has flexibility to take care of change
- It uses general purpose machine and equipments
- Efficient use of machine

3)Fixed Position Layout:

- This type of layout is the least important for today's manufacturing industries. In this type of layout the major component remain in a fixed location, other materials, parts, tools, machinery, man power and other supporting equipment's are brought to this location.

- The major component or body of the product remain in a fixed position because it is too heavy or too big and as such it is economical and convenient to bring the necessary tools and equipment's to work place along with the man power. This type of layout is used in the manufacture of boilers, hydraulic and steam turbines and ships etc.

Lecture 19

Functional area of management: Controlling production in terms of quality and quantity

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Controlling Production

Controlling production: It includes the two things as Quantity and Quality:

- Controlling by exceptions involves comparing the plan with the plant's performance. Orders may be filed by due date, work to be completed in each department may be recorded each day or bar chart may be used. Then the operation manager has to decide what to do to improve future performance.
- The methods used in quality control have been developed further than those for other control systems and are used in many other systems including cost control. The quality level is based on: The value of quality to the customer
- The cost of the quality
- Then controls should be established to obtain that quality. The cost will increase, if an attempt is made to exceed that level of quality. At the same time, if quality is allowed to go below the level, then firm will lose its customers.

Steps needed in system of control quality:

- Set standards for your quality range.
- Measure your actual performance.
- Compare performance with standards.
- Make the corrections when needed.
- Standard of quality may be set for dimension, colour / flavour, strength, content weight, services and other characteristics.

Total Quality Management (TQM)

ISO 9000 deals with the process. Total quality management is about people. TQM links quality to customer satisfaction by acting on four aspects i.e.

- Customer requirement.
- Management commitment.
- Total company wide participation.
- Systematic analysis quality problems.
- TQM philosophy stresses a systematic, integrated, consistent, organization wide perspective, involving everyone and everything in an organization. ISO is a milestone in TQM journey.

Core concepts for TQM are as under:

- Customer satisfaction – Be customer focused.
- Internal customers are real.
- Work of process may on good place – Great work culture.
- Measurement – Measure to work.
- Team work – Top management must be involved.
- People make quality – Quality is an attitude empowering.
- Continuous improvement cycle.
- Prevention steps of poor quality production.

ISO (International Organizational for Standardization) standards:

- The world trade organization's agreement on technical barriers to trade emphasis. The vital role laid by international standards in providing the technical foundation for global market. When this is done, conflicts are minimize and agreements are more.

- The ISO 9000 family addresses various aspects of quality management and contains some of ISO's best known standards. The standards provide guidance and tools for companies and organizations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved.
- There are many standards in the ISO 9000 family, importants are:
- ISO 9001:2008 - sets out the requirements of a quality management system
- ISO 9000:2005 - covers the basic concepts and language
- ISO 9004:2009 - focuses on how to make a quality management system more efficient and effective
- ISO 19011:2011 - sets out guidance on internal and external audits of quality management systems.

Farm Operations: The greatest amount of attention that needs to be paid is to the observance of hygienic and sanitary practices in various farm operations. Some of the typical problems and the foods in which they are encountered are pesticide residues in fruits, vegetables, egg and milk; pathogen in fruits, vegetables, spices, poultry and sea food; insects in fruits, vegetables, spices; high microbial load in the most fresh produce, milk, meat and poultry; mycotoxins in cereals, oil seed and milk. Almost all these problems can be effectively overcome by adherence to farm practices.

Quality control in Agricultural Product

Ministry of agriculture likely to produce guidelines for agriculture produce and processed food items. The standard, India GAP (good agricultural practices), would be based on the lines of Euro GAP, Codex Alimentarius and other certification protocols. The adoption would initially be voluntary for Indian farmers. But farmers and processed-food makers from other countries seeking to export agriculture produce and processed food items to India will have to comply with the standard.

AGMARK

- Quality Certification Mark : AGMARK
- Acts as : Third Party Guarantee to Quality Certified.
- Legal Backup : Agricultural Produce(Grading and Marking) Act, 1937 as amended in 1986. ***FSSAI (Food Safety and Standards Authority of India)***
- has been established under Food Safety and Standards Act, 2006

FSSAI has been created for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

Quality management:

Hazard Analysis Critical Control Point (HACCP)

- Since its introduction in the early 1970's, HACCP system is a cost effective management tool for food safety assurance that can be applied to all the sections of the food chain from primary production to processing, manufacturing, distribution and retails to the point of consumption. • The WTO and sanitary and phytosanitary measure (SPS) agreement emphasis that food safety standards be based on scientific principles as they are related to risk assessment.
- Currently the emphasis organization like Bureau of India Standards is to issue certification on HACCP, which will enhance the marketability of Indian food Products like meat, poultry, vegetables, sea-foods and processed in the global market.

Lecture 20

Material Management: Inventory, types, costs and EOQ

Material management is an approach for planning, organizing, and controlling all those activities principally concerned with the flow of materials into an organisation.

- The scope of Materials Management varies greatly from company to company and may include material planning and control, production planning, Purchasing, inventory control, in-plant materials movement, and waste management.
- It is a business function for planning, purchasing, moving, storing material in a optimum way which help organisation to minimise the various costs like inventory, purchasing, material handling and distribution costs

Material Planning and control: involve the decisions like

- amount of material needed for desired output
- Amount of inventory and its storage
- Vendor relations
- Quality material and its price per unit
- Quantity and time of order
- Method of receiving and transporting
- Handling of defective material and stock

5 Rs of Materials Management: The fundamental objectives of the Materials Management function, often called the famous 5 Rs of Materials Management, are acquisition of materials and services

- Of the right quality;
- In the right quantity;
- At the right time;
- From the right source;
- At the right price

The management point of view, the key objectives of MM are

- To buy at the lowest price, consistent with desired quality and service
- To maintain a high inventory turnover, by reducing excess storage, carrying costs and inventory losses occurring due to deteriorations, obsolescence and pilferage.
- To maintain continuity of supply, preventing interruption of the flow of materials and services to users.
- To maintain the specified material quality level and a consistency of quality this permits efficient and effective operation.
- To develop reliable alternate sources of supply to promote a competitive atmosphere in performance and pricing.
- To minimize the overall cost of acquisition by improving the efficiency of operations and procedures.
- To hire, develop, motivate and train personnel and to provide a reservoir of talent.
- To develop and maintain good supplier relationships in order to create a supplier attitude and desire furnish the organisation with new ideas, products, and better prices and service.
- To achieve a high degree of cooperation and coordination with user departments.

- To maintain good records and controls that provides an audit trail and ensures efficiency and honesty.

Materials Management thus can be defined as that function of business that is responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling materials in an optimum manner so as to provide service to the customer, at a pre-decided level at a minimum cost.

The broad Materials function has the following as identified and interlinked sub functions:

Materials planning and control: Materials required for any operation are based on the sales forecasts and production plans. Planning and control is done for the materials taking into account the materials not available for the operation and those in hand or in pipe line. This involves estimating the individual requirements of parts, preparing materials budget, forecasting the levels of inventories, scheduling the orders and monitoring the performance in relation to production and sales.

Purchasing: Basically, the job of a materials manager is to provide, to the user departments right material at the right time in right quantity of right quality at right price from the right source.

To meet these objectives the activities undertaken include selection of sources of supply, finalization of terms of purchase, placement of purchase orders, follow up, maintenance of relations with vendors, approval of payments to vendors, evaluating, rating and developing vendors.

Stores: Once the material is delivered, its physical control, preservation, minimization of obsolescence and damage through timely disposal and efficient handling, maintenance of records, proper locations and stocking is done in Stores.

Inventory control: One of the powerful ways of controlling the materials is through Inventory control. It covers aspects such as setting inventory levels, doing various analyses such as ABC , XYZ etc ,fixing economic order quantities (EOQ), setting safety stock levels, lead time analysis and reporting.

Materials Management's scope:

The scope is vast. Basically, under its scope are

- emphasis on the acquisition aspect
- inventory control and stores management
- material logistics, movement control and handling aspect
- purchasing, supply , transportation , materials handling etc
- supply management or logistics management

Inventory Management

The list of all the physical property of a business along with their values at a specific point of time is called farm inventory. Inventory for a business is taken at two points of time in a year i.e., at the beginning of the agricultural year and at the end of the year. It constitutes cash assets, depreciable assets and non-depreciable assets. The difference in the inventory at the two points of time indicates the changes in the inventory.

Farm inventory forms the basis for the preparation of income statement, balance sheet, measurers of income, etc. The loss in the value of the asset due to depreciation can be worked out from the farm inventory.

- Inventory refers to those idle resources which have economic value and thus it may be defined as usable but idle resources that have economic value.

- Inventory is a stock of direct or indirect material, from raw material to finished goods stocked in order to meet an unexpected future demand.

- In other words inventory is a physical stock of goods kept for the future purposes.
- Inventory Management or control refers to maintaining, for a given financial investment, an adequate supply of something to meet an expected demand pattern. It thus deals with determination of optimal policies and procedures for procurement.

- Inventory is expressed in terms of both quantity and monetary value. In terms of quantity , it can be expressed as the number of units of an item lying where as in monetary terms it is the sum total of the monetary value of all its items.

Functions of Inventory:

Inventory is a blocked capital: In the sense that it is not being used in the present, it plays a distinct role in the life of any organization for a smooth and efficient running of business.
For example, if a firm does not have any inventory then as soon as it receives a supply order, it will look for raw material to manufacture the items and thus the customers shall be kept waiting. It alone may cost the firm its customers who may not like to wait. Further, all the internal agencies shall have to work in emergency for getting the material, completing the production etc. if there is no inventory. Inventories decouple individual phases of the total operation.

- Protect against unpredictable fluctuations in demand and supply.
- Take the advantage of price discounts through bulk purchases.
- Take the advantage of batches and longer production run.
- Provide flexibility to allow changes in production plans in view of changes in demands etc.
- Facilitate intermittent production.
- The basic function of inventory is thus to insulate the production process from changes in the environment. It decouples various interlinked functions and thus enables each function to conduct itself independently like purchasing, production, marketing etc.

Why Inventory goes up or down?

There are several reasons, the most important for a high inventory being a

- High Lead time
- Tendency to play safe
- Stock outs and shortages lead to criticism
- Standardization and variety reduction not given emphasis
- Uncertainty / scarcity of items triggering over stocking **Why Inventory needs to be optimally used?**

- Inventory is Blocked money, the working capital. It has a cost (approx. 20% of Average inventory)
- Opportunity cost of investment funds: Investment in external securities / Equipment's can earn a return for the company
- Insurance cost: Inventory is an asset needing insurance
- Storage costs: Cost is associated just for storing an item. When large number of items are stored the following also become costs that cannot be ignored Obsolescence and deterioration Damage, pilferage or obsolescence

Classification of Inventories or types of inventory

Raw materials - Raw materials are input goods intended for combination and/or conversion through the manufacturing process into semi-finished or finished goods. They change their form and become part of the finished product.

Components and Parts - Just as raw materials are converted to finished goods in a manufacturing operation, components and parts are assembled into finished goods in an assembly operation.
Maintenance, repair and operating inventories (MRO) - These include parts, supplies, and materials used in or consumed by routine maintenance and repair of operating equipment, or in support of operations.

In-process goods - These are goods in the process of manufacturing and only partially completed. They are usually measured for accounting purposes in between significant conversion phases. In-process inventories provide the flexibility necessary to deal with variations in demand between different phases of manufacturing.

Finished goods - These represent the completed conversion of raw materials into the final product. They are goods ready for sale and shipment.

Resale goods - These are goods acquired for resale. Such goods may be purchased by a wholesaler for resale to distributors, or by distributors for resale to consumers, etc.

Capital goods - These are items (such as equipment) that are not used up or consumed during a single operating period, but have extended useful lives and must be expensed over multiple operating periods.

Inventory control

Inventory control refers to the process by which the investment in materials and parts carried in stock is regulated within predetermined limits set in accordance with the inventory policy established by management.

Reasons for inventory carrying

- Daily purchases not worthwhile
- Procurement involve some lead time
- Large order avail some economies
- Safety against contingencies such as strikes etc
- If price rise is anticipated
- Finished goods inventory to meet demand
- Imported raw materials
- To avoid high costs of stock outs.

Costs of inventory accumulation and Inventory depletion

Disadvantages of Inventory accumulation	Disadvantages of inventory depletion
• Locking up of working capital • More storage space • High insurance charges • High taxes • Greater handling and distributing costs • High cost of recording • Deterioration in quantity • Chances of pilferage • Evaporation of alcoholic materials	• Production stoppages • Idle machine capacity • Idle labour • Burden of fixed overheads • Failure to meet delivery orders resulting into loss of goodwill

Major activities of inventory control

1. Planning the inventories: on the basis of production schedule, demand forecasting and customer orders.
2. Procurement of inventories: from selected suppliers comparing their quotations, selection and order placement.
3. Receiving and inspection of inventories:
4. Storing and receiving the inventories
5. Recording the receipts and issues of inventories
6. Physical verification of inventories
7. Follow up functions
8. Material standardization and substitution **Inventory control techniques**

Most popular inventory control techniques are

1. EOQ (Economic ordering quantity): How much of an item to order?
2. Re order level (ROL): When to order?
3. Selective Inventory control (ABC Analysis)

Inventory Costs

- Four major types of costs

1) Cost of ordering: Paper work
costs
Follow up cost
Costs involved in receiving, inspection, checking and handling to store
Any set up cost charged by supplier
The salary and wages to purchase department ***2)***
Cost of inventory carrying:
Interest on capital Insurance
and tax
storage cost including provision of storage area and facilities like bins, racks
allowances for spoilage salaries of store staff ***3)Understocking costs:***
the cost incurred when the item is out of stock. it includes cost of
lost of production during the period of stock out cost for
emergency purchase
4) ***Overstocking cost:*** the cost incurred when the item is more than the requirement

Economic Order Quantity (EOQ) Models

EOQ: How much to order
– optimal order quantity that will minimize total inventory costs(ordering costs and inventory carrying costs)
Basic EOQ model is production quantity model
Inventory carrying and ordering costs are mutually exclusive.

Number and size of order	Ordering cost	Carrying cost
A) Few orders , each of large size	Low	High
B) More orders ,each of small size	High	Low

it indicate that quantity which is fixed in such a way that the total variable cost of managing inventory can be minimized.
While calculating EOQ two costs must be taken in to consideration

1) Cost of ordering
2) Cost of carrying inventory

At EOQ the total variable cost of managing the inventory is minimum. EOQ strikes a balance between the ordering and carrying cost. It devices such a quantity of each order at which the total ordering cost and carrying cost would be minimum. At this point both ordering and carrying costs are equal.

Economic Order Quantity

- Economic Order Quantity (EOQ) is the lot size that minimizes total annual inventory holding and ordering costs.
- **Assumptions of EOQ**
    1. The demand rate is constant and known with certainty.
    2. There are no constraints on lot size.
    3. The only relevant costs are holding costs and ordering/setup costs.
    4. Decisions for items can be made independently of other items.
    5. Lead time is constant and known with certainty.

Use of model:

The model is an excellent guide in scientific inventory management. This compels the manager to analyze the requirements and cost of inventory holding. It is useful in inventory management by fixing maximum & minimum levels of stock holding. Ordering level I (that is, the stock point when reordering is required) most economic quality to order.

Quantity per Order: the quantity per order affects the level of inventory

- At certain intervals such as once in a week, a month or quarter.
- When the inventory reaches a certain quantity.
- Placing Responsibility of Ordering :
- One person should have responsibility for ordering all materials but that person should obtain the help of those knowledgeable people in the area where the goods are needed. By having a single person responsible, duplicate orders for the same material are avoided. The specialized skill needed for purchasing can be used and the responsibility for improvements in buying-process is established.

Sources of Supply: This is important because….

- Price of purchased good is a major cost in the production.
- Reliability in delivery and quantity affects the operations.
- Vendor can be valuable source of information.
- Vendor can provide valuable services.

Higher price charged for raw materials because…..

- Higher quality.
- More reliable and faster service.
- Better terms for returning goods.
- More services such as packaging and information.
- Better or delayed payments plan.
- The sources of supply may be brokers, whole sellers, manufacturer or others. Each of these sources provides valuable services. Wholesaler stocks many items and makes quick delivery of wide varieties of items. Manufacturer does not involve intermediate handler, but it is restricted to a product supply. Manufacturer may have sales representatives or agents who can help small business. Regional and National trade fairs and trade association provides valuable information on sources and their products and services.

Receiving Materials:

- The receipt and forwarding of the materials to inventory constitute the last steps in inventory.

- Checking whether the material is in conformity with order, proper condition and quality.
- Materials are checked for damage in transport, for specified characters such as colour, size and item specified and proper quantity and price.
- The receiving agent preparing materials for storing.

Lecture 21

Personnel management: Recruitment, selection and training

Human Resource Management:- Human Resource Management includes all activities used to attract & retain employees and to ensure they perform at a high level in meeting organizational goals.

These activities are made up of

1. Recruitment & selection.
2. Training and development.
3. Performance appraisal and feedback.
4. Pay and benefits.
5. Labor relations.

Components of a HRM System

- Component should be consistent with the others, organization structure, and strategy.
- ***Recruitment:*** develop a pool of qualified applicants.
- Selection: determine relative qualifications & potential for a job.
- ***Training & Development:*** ongoing process to develop worker's abilities and skills.
- ***Performance appraisal & feedback:*** provides information about how to train, motivate, and reward workers.
  - Managers can evaluate and then give feedback to enhance worker performance.
- ***Pay and Benefits:*** high performing employees should be rewarded with raises, bonuses.
  - Increased pay provides additional incentive.
  - Benefits, such as health insurance, reward membership in firm.
- ***Labor relations:*** managers need an effective relationship with labor unions that represent workers.
  - Unions help establish pay, and working conditions.

STAFFING

The foundation of any organization is the talented and hardworking people, who are the principal assets of any firm. It is an established fact that the growth of an organization requires the continual infusion of quality staff. Thus, adequate staffing or the provision for appropriate human resources is an essential requirement for any organization's success. It is, therefore, believed that an organization can achieve its objectives only when it has the right persons in the right positions.

Meaning

In the simplest terms, staffing is 'putting people to jobs'. It begins with workforce planning and includes different other function like recruitment, selection, training, development, promotion, compensation and performance appraisal of work force. In other words, staffing is that part of the process of management which is concerned with obtaining, utilizing and maintaining a satisfactory and satisfied work force. *Staffing,* is the management function devoted to acquiring, training, appraising, and compensating employees. In effect, all managers are human resource managers, although human resource specialists may perform some of these activities in large organizations. Solid HRM practices can mold a organization's workforce into a motivated and committed team capable of managing change effectively and achieving the organizational objectives.

Today, staffing may involve any combination of employees including daily wagers, consultants and contract employees. Staffing recognizes the importance of every single person employed by an organization as it is the individual worker, who is the ultimate performer.

Need and Importance of Staffing

In any organization, there is a need for people to perform work. The staffing function of management fulfills this requirement and finds the right people for the right job. Basically, staffing fills the positions as shown in the organization structure. Since the right people have to be chosen while selecting a person, the human element is very important. Staffing provides the human element or instinct while selecting a person. The attitude, aptitude, commitment, loyalty are important qualities perceived by the organization. It is also considered to be a specialized area and the theory of knowledge available on the subject is vast. Researches on various aspects of staffing i.e., recruitment, selection, compensation and incentives, training and development, can be utilized for better results.

Human resources are the foundation of any business. The right people can help you take your business to the top; the wrong people can break your business. Hence, staffing is the most fundamental and critical drive of organizational performance. The staffing function has assumed greater importance these days because of rapid advancement of technology, increasing size of organization and complicated behaviour of human beings. Human resources are the most important asset of an organization. The ability of an organization to achieve its goal depends upon the quality of its human resources. Therefore, staffing is a very important managerial function. No organization can be successful unless it can fill and keep filled the various positions provided for in the structure with the right kind of people.

Proper staffing;

- helps in discovering and obtaining competent personnel for various jobs;
- makes for higher performance, by putting right person on the right job;
- ensures the continuous survival and growth of the enterprise through the succession planning for managers;
- Helps to ensure optimum utilization of the human resources. By avoiding over manning, it prevents under-utilization of personnel and high labour costs. At the same time it avoids disruption of work by indicating in advance the shortages of personnel; and
- Improves job satisfaction and morale of employees through objective assessment and fair rewarding of their contribution.

Staffing as part of Human Resource Management

It is a function which all managers need to perform. It is a separate and specialized function and there are many aspects of human relations to be considered. It is the job of managers to fill positions in their organization and to make sure that they remain occupied with qualified people. Staffing is closely linked to organizing since after the structure and positions have been decided, people are required to work in these positions. Subsequently, they need to be trained and motivated to work in harmony with the goals of the organization. Thus, staffing is seen as a generic function of management.

The staffing function deals with the human element of management. Managing the human component of an organization is the most important task because the performance of an organization depends upon how well this function is performed. The success of an organization in achieving its goals is determined to a great extent on the competence, motivation and performance of its human resources.

It is the responsibility of all managers to directly deal with and select people to work for the organization. When the manager performs the staffing function his role is slightly limited. Some of these responsibilities will include placing the right person on the right job, introducing new employees to the organization, training employees improving their performance, developing their abilities, maintaining their morale and protecting their health and physical conditions. In small organizations, managers may perform all duties related to employee's salaries, welfare and working conditions.

But as organizations grow and number of persons employed increases, a separate department called the human resource department is formed which has specialists in managing people. The management of human resources is a specialized area which requires the expertise of many people. The number of human resource specialists and size of this department gives an indication of the size of the business as well. For a very large company, the Human Resources Department itself will contain specialists for each function of this department.

Human Resource Management includes many specialized activities and duties which the human resource personnel must perform. These duties are:

- Recruitment i.e., search for qualified people
- Analyzing jobs, collecting information about jobs to prepare job descriptions.
- Developing compensation and incentive plans.

- Training and development of employees for efficient performance and career growth.
- Maintaining labour relations and union management relations.
- Handling grievances and complaints.
- Providing for social security and welfare of employees.
- Defending the company in law suits and avoiding legal complications.

This shows that Human Resources Management is a much broader concept and includes a wider gamut of activities.

Staffing Process

The prime concern of the staffing function in the management process is the timely fulfillment of the manpower requirements within an organization. It is important to appreciate staffing as a process that starts from understanding the manpower requirements within the organization and identifying the potential sources from where it can be met, either from within the organization or from outside. And, given that 'the right person' is scarce, there is need to 'market' the job and the organization to the people. Even in situations where a single job vacancy might attract a few hundreds of the applicants, there is a challenge of selecting the most appropriate one.

Freshly appointed persons might need orientation training to familiarize them of the way the things are done in an organization. And, in case they have been selected only on the basis of academic qualifications and aptitude for learning, they might need training in specific skills as well. The employee's experiences during orientation and placement form his/her 'first impression' of the organization. Even whilst on the job, the employees need training for up gradation of knowledge and skills and for preparing for higher responsibilities. So staff training and development is another important aspect of the staffing process. Here is description of various stages involved in staffing process:

I. **Estimating the Manpower Requirements:** while designing the organizational structure, we undertake an analysis of the decisions and the decision-making levels, activities as well as relationship among them with a view to evolving the horizontal and vertical dimensions of the structure. Thus, various job positions are created. Clearly, performance of each job necessitates the appointment of a person with a specific set of educational qualifications, skills, prior experience and so on. Thus, understanding manpower requirements is not merely a matter of knowing how many persons we need but also of what type. Given that we need to encourage women, persons from backward communities and persons with special abilities (such as physically challenged, visually and hearing impaired) to assume responsible positions in our organizations, there is a need to understand, and if the need be, to redefine manpower requirements accordingly. Can you think why should we encourage such diversity in the workforce? Operationally, understanding the manpower requirements would necessitate workload analysis on the one hand and workforce analysis on the other. Workload analysis would enable an assessment of the number and types of human resources necessary for the performance of various jobs and accomplishment of organizational objectives. Workforce analysis would reveal the number and type available. In

fact such an exercise would reveal whether we are understaffed, overstaffed or optimally staffed. It may be pointed out that neither over-staffing nor under-staffing is a desirable situation because a situation of overstaffing somewhere would necessitate employee removal or transfer elsewhere and a situation of understaffing would necessitate the starting of the recruitment process. However, before that can be done, it is important to translate the manpower requirements into specific job description and the desirable profile of its occupant — the desired qualifications, experience, personality characteristics and so on. This information becomes the base for looking for potential employees.

II. **Recruitment:** Recruitment may be defined as the process of searching for prospective employees and stimulating them to apply for jobs in the organization. The information generated in the process of writing the job description and the candidate profile may be used for developing the 'situations vacant' advertisement. The advertisement may be displayed in print media or flashed in electronic media. This step involves locating the potential candidate or determining the sources of potential candidates.

III. **Selection:** Selection is the process of choosing from among the pool of the prospective job candidates developed at the stage of recruitment. Even in case of highly specialized jobs where the choice space is very narrow, the rigor of the selection process serves two important purposes: (i) it ensures that the organization gets the best among the available, and (ii) it enhances the self-esteem and prestige of those selected and conveys to them the seriousness with which the things are done in the organization. Those who are able to successfully negotiate the test and the interviews are offered an employment contract, a written document containing the offer of employment, the terms and conditions and the date of joining.

IV. **Placement and Orientation:** Joining a job marks the beginning of socialization of the employee at the workplace. The employee is given a brief presentation about the organization and is introduced to his superiors, subordinates and the colleagues. He is taken around the workplace and given the charge of the job for which he has been selected. This process of familiarization is very crucial and may have a lasting impact on his decision to stay and on his job performance. Orientation is, thus, introducing the selected employee to other employees and familiarizing him with the rules and policies of the organization. Placement refers to the employee occupying the position or post for which the person has been selected.

V. **Training and Development:** What people seek is not simply a job but a career. Everyone must have the opportunity to rise to the top. The best way to provide such an opportunity is to facilitate employee learning. Organizations' have either in-house training centers or have forged alliances with training and educational institutes to ensure continuing learning of their employees. The organizations too benefit in turn. If employee motivation is high, their competencies are strengthened; they perform better and thus, contribute more to organizational effectiveness and

efficiency. By offering the opportunities for career advancement to their members, organizations are not only able to attract but also retain its talented people.

Thus, staffing includes acquisition, retention and development of the most important resource of an organization, that is, its human capital.

Aspects of Staffing

There are three important aspects of staffing; Recruitment, Selection and Training:

Recruitment: Recruitment refers to the process of finding possible candidates for a job or a function. It has been defined as 'the process of searching for prospective employees and stimulating them to apply for jobs in an organization.'

Advertising is commonly part of the recruitment process, and can occur through several means, through newspapers, using newspaper dedicated to job advertisement, through professional publication, using advertisements placed in windows, through a job center, through campus interviews, etc.

Sources of Recruitment

The object of recruitment is to attract potential employees with the necessary characteristics or qualification, in the adequate number for the jobs available. It locates available people for the job and invites them to apply for the job in the organization. The process of requirement precedes the process of selection of a right candidate for the given positions in the organization.

The requisite positions may be filled up from within the organization or from outside. Thus, there are two sources of recruitment – Internal and External.

A. **Internal Sources:** There are two important sources of internal recruitment, namely, transfers and promotions, discussed below;
   - **Transfers:** It involves shifting of an employee from one job to another, one department to another or from one shift to another, without a substantive change in the responsibilities and status of the employee. It may lead to changes in duties and responsibilities, working condition etc. Transfer is a good source of filling the vacancies with employees from over-staffed departments. It is practically a horizontal movement of employees.
   - **Promotions:** Promotion leads to shifting an employee to a higher position, carrying higher responsibilities, facilities, status and pay. Promotion is a vertical shifting of employees. This practice helps to improve the motivation, loyalty and satisfaction level of employees. It has a great psychological impact over the employees because a promotion at the higher level may lead to a chain of promotions at lower levels in the organization.

B. **External Sources:** An enterprise has to tap external sources for various positions because all the vacancies cannot be filled through internal recruitment. The existing staff may be insufficient or they may not fulfill the eligibility criteria of the jobs to be filled. External recruitment provides wide choice and brings new blood in the organization. The commonly used external sources of recruitment are discussed below:

- **Direct Recruitment:** Under the direct recruitment, a notice is placed on the notice-board of the enterprise specifying the details of the jobs available. Job-seekers assemble outside the premises of the organization on the specified date and selection is done on the spot. The practice of direct recruitment is followed usually for casual vacancies of unskilled or semi-skilled jobs. Such workers are known as casual or 'badli' workers and they are paid remuneration on daily wage basis.
- **Casual Callers:** Many reputed organizations keep a database of unsolicited applicants in their offices. Such job-seekers can be a valuable source of manpower. A list of such job-seekers can be prepared and can be screened to fill the vacancies as they arise.
- **Advertisement:** Advertisement in newspapers or trade and professional journals is generally used when a wider choice is required. Most of the senior positions of industry as well as commerce are filled by this method. Advertisement gives the management a wider range of candidates from which to choose. Advertisements may be placed in leading newspapers.
- **Employment Exchange:** Employment exchanges run by the Government are regarded as a good source of recruitment for unskilled and skilled operative jobs. In some cases, compulsory notification of vacancies to employment exchange is required by law. Thus, employment exchanges help to match personnel demand and supply by serving as link between job-seekers and employers.
- **Placement Agencies and Management Consultants:** In technical and professional areas, private agencies and professional bodies appear to be doing substantive work. Placement agencies provide a nationwide service in matching personnel demand and supply. These agencies compile bio-data of a large number of candidates and recommend suitable names to their clients. Such agencies charge fee for their services and they are useful where extensive screening is required. These professional recruiters can entice the needed top executives from other companies by making the right offers.
- **Campus Recruitment:** Colleges and institutes of management and technology have become a popular source of recruitment for technical, professional and managerial jobs. Many big organizations maintain a close liaison with the universities, vocational schools and management institutes to recruit qualified personnel for various jobs. This is referred to as campus recruitment.
- **Recommendations of Employees:** Applicants introduced by present employees, or their friends and relatives may prove to be a good source of recruitment. Such applicants are likely to be good employees because their background is sufficiently known. A type of preliminary screening takes place because the present employees know both the company and the candidates and they would try to satisfy both.
- **Labour Contractors:** Labour contractors maintain close contacts with labourers and they can provide the required number of unskilled workers at short notice. Workers are recruited through labour contractors who are themselves employees of the organization.

- **Advertising on Television:** The practice of telecasting of vacant posts over Television is gaining importance now-a-days. The detailed requirements of the job and the qualities required are publicized along with the profile of the organization where vacancy exists.
- **Web Publishing:** Internet is becoming a common source of recruitment these days. There are certain websites specifically designed and dedicated for the purpose of providing information about both job seekers and job opening. In fact, websites such as www.naukri.com, www.jobstreet.com, www.sarkarinaukri.com etc., are very commonly visited both by the prospective employees and the organizations searching for suitable personnel.

Selection: Selection is the process of identifying and choosing the best person out of a number of prospective candidates for a job. Towards this purpose, the candidates are required to take a series of employment tests and interviews. Each stage many are eliminated and a few move on to the next stage until the right type is found. The process may start right from the screening of the applications.

Process of Selection

The important steps in the process of selection are as follows:

I. **Preliminary Screening:** Preliminary screening helps the Manager eliminate unqualified or unfit job seekers based on the information supplied in the application forms. Preliminary interviews help reject misfits for reasons, which did not appear in the application forms.

II. **Selection Tests:** An employment test is a mechanism (either a paper and pencil test or an exercise) that attempts to measure certain characteristics of individuals. These characteristics range from aptitudes, such as manual dexterity, to intelligence to personality. Important Tests Used for Selection of Employees are;

(a) Intelligence Tests: This is one of the important psychological tests used to measure the level of intelligence quotient of an individual. It is an indicator of a person's learning ability or the ability to make decisions and judgments.

(b) Aptitude Test: It is a measure of individual's potential for learning new skills. It indicates the person's capacity to develop. Such tests are good indices of a person's future success score.

(c) Personality Tests: Personality tests provide clues to a person's emotions, her reactions, maturity and value system etc. These tests probe the overall personality. Hence, these are difficult to design and implement.

(d) Trade Test: These tests measure the existing skills of the individual. They measure the level of knowledge and proficiency in the area of professions or technical training. The difference between aptitude test and trade test is that the former measures the potential to acquire skills and the later the actual skills possessed.

(e) Interest Tests: Every individual has fascination for some job than the other. Interest tests are used to know the pattern of interests or involvement of a person.

III. **Employment Interview:** Interview is a formal, in-depth conversation conducted to evaluate the applicant's suitability for the job. The role of the interviewer is to seek information and that of the interviewee is to provide the same. Though, in present times, the interviewee also seeks information from interviewer.

IV. **Reference and Background Checks:** Many employers request names, addresses, and telephone numbers of references for the purpose of verifying information and, gaining additional information on an applicant. Previous employers, known persons, teachers and university professors can act as references.

V. **Selection Decision:** The final decision has to be made from among the candidates who pass the tests, interviews and reference checks. The views of the concerned manager will be generally considered in the final selection because it is he/she who is responsible for the performance of the new employee.

VI. **Medical Examination:** After the selection decision and before the job offer is made, the candidate is required to undergo a medical fitness test. The job offer is given to the candidate being declared fit after the medical examination.

VII. **Job Offer:** The next step in the selection process is job offer to those applicants who have passed all the previous hurdles. Job offer is made through a letter of appointment/confirm his acceptance. Such a letter generally contains a date by which the appointee must report on duty. The appointee must be given reasonable time for reporting. **Training, Development and Education**

- **TRAINING** is the process of acquiring specific skills to perform a job better. It is a process of learning new skills and application of knowledge. It attempts to improve their performance on the current job or prepare them for any intended job.
- **Education** is the production of desirable changes in human behavior i.e. Knowledge, Attitude and Skill.
- **Development** refers to the learning opportunities designed to help employees grow. It covers not only those activities which improve job performance but also those which bring about growth of the personality, help individuals in the progress towards maturity and actualization of their potential capacities so that they become not only good employees but better men and women.

Types of Training

1. Pre-service training

It is a process through which individuals are made ready to enter a certain kind of professional job, as in agriculture, medicine or engineering. The prerequisite to this is to attend regular classes in a formal institution and need to complete a definite curriculum and courses successfully, and receive a formal degree or diploma.

2. In-service training

In-service training is a process of staff development for the purpose of improving the performance of an incumbent holding a position with assigned job responsibilities. It promotes the professional growth of individuals. In-service training is a problem-centered, learner-oriented, and time-bound series of activities which provides the opportunity to develop a sense of purpose, broaden perception of the participants, and increase their capacity to gain knowledge and mastery of techniques. In-service training may broadly be categorized into five different types.

i. **Induction or Orientation training**: Induction training is given immediately after employment to introduce the new entrant to the job. This helps in moulding the individuals as per requirements of the organization.

ii. **Foundation training**: This training is usually provided at an early stage of service-life. Every staff member needs some professional knowledge about various rules, regulations, and procedures of the organization, financial transactions, administrative capability, communication skills, leadership ability, coordination and cooperation among institutions and their linkage mechanism, report writing and so on. This training is made available to the employees to strengthen the foundation of their service career.

iii. **Maintenance or Refresher training**: This training is offered to update and maintain the specialized subject-matter knowledge of the incumbents. This deals with new information and new methods, as well as review of older materials. This type of training is given to the employees to keep them at their peak performance level and also to prevent them from getting into a rut.

iv. **On-the-Job training**: This is periodical or ad hoc training on the job, and is generally provided by the superior officer or specialists to the subordinate field staff. This training is problem or technology oriented and may include formal presentations, informal discussion, and opportunities to try out new skills and knowledge in the field.

v. **Career or Development training**: This type of training is designed to upgrade the knowledge, skills and ability of employees to help them assume greater responsibility in higher positions. This training may lead to the acquisition of higher degree to diploma by the employees, and motivate them to move up in the higher levels of administrative hierarchy.

Phases of training

Broadly, there are three phases of a training process. These are planning, implementation and evaluation.

i. **Planning phase**: It encompasses several activities of which-training needs identification and curriculum development-are very important. The process of identifying training needs involves job analysis, task analysis, and knowledge and skill-gap analysis. The curriculum development specifies what will be taught, the training content; and how it will be taught, the training methods.

The training organization should develop the training programme jointly with the organization from which the trainees shall come.

ii. **Implementation phase**: This is the process of putting a training programme into operation. Information about training courses is made available to the intending persons well in time. All efforts should be made to enroll participants to full capacity of the training organization. Trainers, trainees, training materials and facilities need to be well managed and coordinated to run the programme smoothly.

iii. **Evaluation phase**: Evaluation is a process of determining the relevance, effectiveness, and impact of training in relation to its objectives. The results of evaluation should be utilized by both the trainers' and trainees' organizations to improve subsequent training programmes.

Training methods

The commonly used methods for training of extension personnel are discussed in brief. Some of them may be also for the training of farmers.

Lecture: It is a method of verbal presentation of a topic by a speaker to a group of audience. Lecture should be well organized and well prepared so that it can draw attention of the audience and convey the message to them. Visual aids may be used during the talk and a question-answer session may follow it. A series of lectures on a particular theme shall facilitate the audience to develop a comprehensive idea on the topic and gain by the rich experience of the speakers. Lecture facilitates presentation of information in a systematic way. The chief limitation in lecture method is the passive role of the audience.

Group Discussion: The lecture method may be made more participative, if at the end the audience are allowed to discuss the topic in presence of the speaker and elicit the latter's comments and clarification on the points raised. This shall lead to a better understanding of the topic, as the participants are more actively involved, have the opportunity to express their views and get their doubts clarified. Learning is reinforced through the interaction of the audience with the speaker.

Seminar: It is one of the most important forms of group discussion and is more formal in nature. The seminar enables a study in depth to be made in specific areas under the guidance of experts. In seminar, the discussion papers prepared by the participants on the basis of their study and research are presented, and discussion is based primarily on these papers. A seminar may have one or more plenary sessions. This method has the advantage of pooling together the opinion of a large number of persons. At the end, some conclusions and recommendations are arrived at, for taking action.

Panel Discussion: A panel or a group of three or four experts in a specific area of specialization may be invited to address a group of trainees on a particular subject. The mutual interactions of the panelists among themselves and with the audience can lead to an effective understanding of the topic. A panel discussion should be guided by a strong moderator to ensure enough time to each panelist, to oversee the question answer session and to sum up the entire proceedings.

Colloquium: This is a modified version of panel discussion, in which three or four resource persons discuss a specific topic. The audiences are free to express opinions, raise issues and ask questions. In colloquium there is more of audience participation.

Symposium: It is a meeting in which a small number of resource persons present short prepared papers on a given topic. Each one speaks for a definite amount of time and presents a different phase or sub-division of a general topic. The speakers are of approximately equal ability to avoid domination by a speaker or giving the audience a distorted view of the subject. Interaction with the audience is not expected. Symposium is primarily meant for information gathering at the professional level.

Workshop: A workshop is a cooperative gathering of individuals who discuss, learn and apply practical skills under expert supervision. It may be held for a day or a number of consecutive days. There is a planning session where all participants are involved in the beginning. Considerable time should be allotted for the work sessions.

In workshop method the participants exchange ideas, experiences and skills and on this basis produce a product or prepare a programme for future action. It helps in correctly doing a job and proper shaping of an action oriented programme.

Syndicate Method: A syndicate is primarily a study group, the members of which represent the principal sub-groups participating in the programme. The syndicate has a chairperson and a secretary, the positions of which are generally held in rotation by the participants.

A problem is assigned to the syndicate for study and solution. The group works on its own, with only minimum guidance from the training staff, makes its own library studies, collects data, exchanges views and experience, avails itself of the facility of consulting specialists in the field, and finally prepares a report on the assignment. The report of each syndicate is presented to an assembly of the training faculty and all the syndicate in the training programme as a whole for comments and discussion. The study on any subject may continue for a month or more, with 10 to 12 sittings.

Case Study: In this method, a written case or a problem situation is presented to the participants in a programme for careful study and examination from all facets, so as to enable them to exercise their analytical, synthetically and decision making powers. As there is no single infallible solution to a problem, different solutions will be evolved and, in course of evaluation of these solutions, participants are enabled to appreciate the view points of others and also see the lacunae in their own thinking and analysis. The interrelatedness of various factors operating in the situation is also highlighted.

Role Playing: The participants can be made to act and re-live a particular situation to get a real feel of the roles they are actually called upon to play. Successful role playing requires good empathy.

Role playing is a particular technique which gives an insight into the complex behavioral patterns of individuals. Even the observers tend to see in the roles played by others the images of their own behaviour

and attitude. Role playing units should be small in size so that the trainees can really identify with the live roles they play. Special emphasis should be put on the discussion following the exercise.

Brain Storming: A small group of knowledgeable persons is given a problem and asked to produce as many solutions as possible within a given period. Spontaneity and creativity are important. The purpose is to promote group creativity, so that all aspects of a problem are considered. It should be restricted under twenty people per group.

The ideas presented are recorded so that everyone can see them. When a large number of suggestions are made, the group is asked to reflect on them and evaluate their merits and demerits. A reasonably small number of worthwhile final solutions may emerge from his evaluation.

Buzz Session: This technique involves dividing a large group into much smaller ones, in which a topic is discussed within a limited period of time. The groups are expected to react i.e. produce ideas, opinion, and questions etc. within about five minutes and make oral report to all groups involved in the exercise. The purpose is to involve each every participant. This method is sometimes used to break up large meeting and to add variety and interest. It may also be used to solicit solutions to problems or to gather opinion.

Sensitivity Training: Members are brought together in a free and open environment in which participants discuss themselves and interact. The discussion is lightly directed by a behaviour expert, who creates the opportunity for participants to express their ideas, beliefs and attitudes.

The objective of this method is to provide the participants with increased awareness of their own behaviour and of how others perceive them, greater sensitivity to the behaviour of others and increased understanding of group processes. Specifically it aims at increased ability to empathize with others, improved listening skills, greater openness, increased tolerance for differences and improved conflictresolution skills.

Management Game: It is a training method that deals with certain specific aspects of business or administrations. It is a simulated exercise representing, as closely as possible, the constraints and pressures of the day-to-day work environment of the participants. The participants are presented with information about operations of an organization-management of human resource, financial, marketing etc. They are grouped in functional teams to consider the sequence of events and problems and manage the operations.

The task includes finding solutions to the problems, taking decisions, and dealing with people. Each team takes a decision considering the data and information available to it, within the broad parameters and objectives of the game. The team analyzes the outcomes of this decision in the light of their effect on the situation and other events in the operation. And the team then proceeds to take further decisions addressing the new situation, events, and circumstances.

Interactive Video: It refers to a video programme with which an individual can interact. It allows

the user to take part in the sequencing and selection of video material, and control the programme according to one's own pace of learning.

Video Conferencing: A telephone or radio network may be used to provide audio communication among groups at two or more locations. This is called audio teleconferencing. A video channel added to an audio link between groups by means of satellite transmission, microwave transmission or a two-way cable television system is video teleconferencing. Video teleconferencing is also known as video conferencing. Experts sitting in the studios listen to the questions and answer 'live' on television. The system reduces the need for travel and is much help to the groups in remote areas.

Need of Training and Development

When jobs were simple, easy to learn and influenced to only a small degree by technological changes, there was little need for employees to upgrade or alter their skills. But the rapid changes taking place during the last quarter century in our highly sophisticated and complex society have created increased pressures for organizations to readapt the products and services produced, the manner in which products and services are produced and offered, the types of jobs required and the types of skills necessary to complete these jobs. Thus, as jobs have become more complex the importance of employee training has increased.

Lecture 22 ***Marketing management: planning the marketing programme, marketing mix and 4 P's***

- According to William Stanton *Marketing is a total system of interacting business activities designed to plan, price, promote and distribute want satisfying products and services to present and potential customers*. Thus the main idea of modern marketing concept is customer satisfaction.
- Marketing is defined as the process of anticipating the needs of targeted customers and finding ways to meet those needs profitably.
- Marketing Management refers to distribution of the firm's product or service to the customers in order to satisfy their needs and to accomplish the firm's objectives. Marketing including developing the product or Service, pricing, distribution, advertisement, merchandising, doing personal selling, promoting and directing sales and service to the customers.

Marketing Principles

- Define your product,
- Promote your product,
- Distribute your product, and

- Maintain a relationship with your customers.

Marketing Concept: Determine what are the consumer needs? And how those needs can be satisfied? Select the market that would be served and what are the advantages?

- Meeting Customer's needs.
- Learning Customer's needs.
- Conscious about the firm's image.
- Looking for danger signals.

Marketing Policies: Formulation of marketing policies for certain area would consider an under point

- Product
- Market
- Profit
- Personal selling
- Customer relation
- Promotion
- Credit policies
- Use of credit card

There are two types of marketing:

(1) **Production oriented (or product driven) marketing:** Traditionally, marketing was viewed as **"selling what you have"** and some managers still approach marketing this way. This is the typical case of **production oriented marketing.**

(2) **Market driven: Market driven** organizations invest in market research to better understand customers, then use the information generated to guide decision making. *The customer* ***is King*** **and** ***getting*** *close the customer* are slogans often encountered in this type of organization. There has been a shift from a production oriented mindset to a market oriented mindset. ***Produce and they will buy*** **is no longer a valid argument in today's context.**

Marketing of Horticultural Crops

- **Marketing** involves finding out what your customers want and supplying it to them at a profit. Marketing is governed by whole marketing process and should be customer

oriented. Production must supply customers with what they want or need. Therefore, people spend their money.

- **Agricultural *marketing*** is achieved by a series of processes which includes harvesting techniques, the grading and sorting of crops and the packing, transport, storage, processing, distribution and selling of products. These are the mechanics of marketing.

- Marketing also involves a series of activities in making available services and information which influence the desired level of production relative to market requirements, and the movement of the product (or commodity) from the point of production to the point of consumption.

Horticultural Products

Cut flowers	Rose, chrysanthemum, carnation, gladiolus, tulip, narcissus, orchid.
Cut foliage	Asparagus tern, leather feat fern, soft ruscus.
Fruit that are normally considered as vegetables	Breadfruit, avocado, tomato, egg plant (brinjal or aubergines) hot pepper, sweet pepper, karella (or bitter gourd), squash, marrow, gourd, cucumber, luffa, pumpkin, plantain, christophine or choyote.
Herbs	Parsley, mint, coriander, dill, basil, rosemary, thyme, sage.
Leaf and stem vegetables	Lettuce, cabbage, spinach, chard, brussels sprout, endive, watercress, celery, asparagus, celeriac, green onion, leek, amaranthus, bean sprout, bokchoy, Chinese cabbage, Chinese celery, spinach, chicory, kohlrabi, fennel.
Other fruit	Strawberry, pineapple, Cape gooseberry, watermelon, sweet melon, raspberry, blackberry, blackcurrant, gooseberry, cranberry, blueberry, rhubarb, loganberry.
Root vegetables	Arrowhead, onion, potato, sweet potato, cassava, yam, taro, garlic, radish, carrot, turnip, parsnip, beetroot, artichoke, dasheen, eddoe.
Spices	Black pepper, chili pepper, cardamom, ginger, clove, cinnamon, bay leaf, turmeric.
Temperate plants for garden	Roses, ornamental shrubs, herbaceous flowers, bedding plants, conifers, flowering bulbs.
Tree fruit	Orange, lemon, lime, mandarin, grapefruit, apple, mango, banana, guava, soursop, lichee, peach, apricot, pear, plum, rambutan, fig, quince, persimmon, durian, chiku, pawpaw, pomegranate, mangosteen, loquat, carambola, cherimoya, cherry, date, mulberry.
Tree nuts	Cashew, walnut, hazelnut, macadamia, pistachio, pecan, coconut, almond.
Tropical plants for house and garden	Dieffenbachia, coleus, yucca, cordyline, dracaena, monstera, fatshedera, ficus, maranta.
Vegetables derived from seeds and flowers	Broccoli, cauliflower, artichoke, pea, bean, lentil, chickpea, broad bean, okra, mangetout pea, asparagus pea, yardlong bean, sweetcorn.

Vine fruit	Grape, passion fruit, kiwi fruit (or Chinese gooseberry).

Characteristics of Horticultural

- Horticultural crop products are eaten for their contribution to the flavour and interest of food because they are rich in minor but essential nutrients, especially vitamins.
- They are not basic treated as food commodities but for the health purpose, people buy them even paying high price. • Their consumption varies from person to person depending on the selling price and the income of the buyer.
- Not all crops are in liking of every person and many of the crops are not traded in large volumes because of the limited market.
- The horticultural products are perishable. There is always a reduction in quality if not sold immediately. They usually lead to a fall in price.
- Wide range and variety of horticultural products are available; therefore, consumer will try to go for low priced products.
- The products are usually freely available in the market and the prices are determined by supply and demand.

Important aspect in Horticultural marketing

Harvesting: The timing, technique and conditions at harvesting can significantly affect prices.
Harvesting prices: With some crops, harvesting can be undertaken early to take advantage of high-priced opportunities. Exploiting these short-term market opportunities requires a close link with the market.

Harvesting and crop maturity: Shelf life and long-term storage is affected by the maturity of the crop at harvest. The storage characteristics of root vegetables are generally improved by only harvesting fully mature crops.

Harvesting and quality: The harvesting and handling affect the quality of the produce in the market. Once a fruit is plucked from a plant or a root or leaf vegetable is harvested, it is cut off from its source of food and, particularly, water.

Proper Treatment: The effects of poor treatment normally show themselves some days later, when the produce is being presented for sale or is in storage. Poor treatment has two effects:

Reduction in price

In the long term, the reputation of the production area is diminished leading to lower prices.

Timing of harvesting during the day: Harvesting should be done in cool climate and the plants are most turgid (high moisture content). The suitable time is the early morning. The other factors

should also be considered as: the dew should be dry, availability of labour, minimize the time produce to left standing in the field.

Harvesting techniques: On high trees fruit can be harvested with a hook and a catching bag on a pole or similar harvesting aid. This prevents fruit falling to the ground.

Marketing Activities

Market research and analysis	Involves finding out about the seed market through studying the nature of the product, where and by whom it is needed, at which times of the year and why**.**
Forecasting	Entails using marketing information for the purposes of planning and making sound business decisions, such as how many bags of seed will be sold and how much seed should be produced.
New product development	Requires the identification of possible new products (e.g.By plant breeding) or making improvements to existing products, such as by using seed treatments.
Product sourcing	Involves licensing varieties and sourcing seeds from own and thirdparty suppliers.
Product management	Concentrates on developing and implementing marketing policy for a seed product or range of products.
Advertising, promotion and public relations	Aims to create product awareness, influence farmers' buying decisions, *(PR)* and build up a positive perception of the company.
Sales order administration and dispatch	Involves receiving and processing orders, allocating stock and dispatching orders, and maintaining stock records.
Stock control and quality assurance	Involves managing the inventory for each class of seed, crop and variety, to ensure maintenance of germination and vigour.
Distribution and transport	Entails moving the seeds from the point of production to the point of sale.
Sales and invoicing	The process of making the actual sale and receiving payment for it, i.e. The end result of the marketing activity.
Management information	Involves collating and interpreting sales *information* and other information as a basis for monitoring operations and planning future activities.
Customer care	Involves after-sales service, dealing with complaints and maintaining customer loyalty.

The Marketing mix

The **marketing mix** deals with the way in which a business uses **price, product, distribution and promotion** to market and sell its product. The marketing mix is often referred to as the **"Four P's**" - since the most important elements of marketing are concerned with: • **Product** - the product (or service) that the customer obtains

- **Price** - how much the customer pays for the product?
- **Place** – how the product is distributed to the customer?
- **Promotion** - how the customer is found and persuaded to buy the product?

It is known as a **"mix"** because each ingredient affects the other and the mix must overall be suitable to the target customer.

What makes for an effective marketing mix?

An effective marketing mix is one which:

- Meets customer needs
- Achieves marketing objectives
- Is balanced and consistent
- Creates a competitive advantage for the business

Thus, the marketing mix for each business and industry will vary; it will also vary over time. For most businesses, one or two elements of the mix will be seen as relatively more important than the others, as illustrated below:

The Marketing mix

- The aim of a seed company is to meet out the needs of their customers. Therefore, a company must think in terms of the **product**, its **price** and the **place** where the farmer needs it. The seed marketing is only effective through **promotion**. Following are various components of marketing.

Product

- The quality of a seed product depends on plant breeding techniques, its production and processing, appearance and performance.

Price

- Price of the seed depends on what farmers perceive as the value of seed of a particular variety and how much he will earn as a return through crop.

Place • The availability of seed is an important factor for a farmer. How much he has to pay for the transportation and storage. Getting the seeds at the right place at the right time depends on the distribution system. It also depends on the distribution chain and market circumstances of seed and the farmer.

Promotion

- Business promotion is an important aspect of communication and to influence the customer. Sale promotion affects an overall cost of a product. A successful seed promotion increases sales so that costs are spread over a larger output. The promotional activities may be a response to competitor activity or a new product launch; therefore, it needs constant flow of messages to the consumer as well as visibility in the market place.

Mix

- Mix is an appropriate word to describe the marketing process as it is a blending of ingredients to fulfill a common purpose. Different markets will require a different balance of ingredients.

1. **A time scale:** A seed company must have a plan which indicates when it expects to achieve its objectives, both in the short, medium and long term. In terms of production, sales, revenue etc.

2. **Strategic elements:** These are involved in the overall development strategy of the company and require considerable judgment and expertise; such decisions might involve the development of a new seed product range or a new distribution system.

3. **Tactical or medium-term elements:** A company should have sufficient flexibility in order to react quickly to changing market circumstances, e.g. in response to competitor activity, which may require changes in pricing and promotional strategies or amendments to marketing plans.

4. **Short-term operational elements:** These involve predictable everyday decisions such as contacts with customers, organizing advertising and point of sale material, and planning distribution. Apart from those elements, which are under the control of management, there are also a number of *environmental factors* beyond the control of management. Some of these factors are:

    1. **Competition:** The competitors' strengths and weaknesses.

    2. **Economic:** Inflation, interest rates, credit availability, commodity prices, taxation.

    3. **Legal:** Import regulations, seed laws, and consumer protection legislation.
    4. **Demographic and geographic:** Regional differences, both physical and cultural.

    5. **Technological:** Mechanization, quality requirements, breeding advances, and computerization.

    6. **Distribution:** The appearance of new outlets, cooperative development, and direct marketing.

Lecture 23

Financial management: financial statement, ratio and capital budgeting

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Agricultural finance:

It is an economic study of borrowing of funds by farmer, of the organization and operation of farm lending agencies and of societies interest in the credit for agriculture.

Loan / Credit:

Certain amount of money provided for certain purpose on certain conditions with some interest which should be repaid sooner or later.

Sources of obtaining credit:

1. Government: in pre british era government provide the loan for agriculture purpose known as Taccavi loan
2. Relatives
3. Landlords
4. Agriculturist money lenders.
5. Professional Money lenders
6. Traders
7. Co-operative and commercial bank

Economic feasibility tests of credit (3 R's of credit):

1. Return from investment
2. Repayment capacity
3. Risk bearing ability

Five P's of credit

1. Character
2. Capacity
3. Capital
4. Condition
5. Common-sense

Tools of farm financial management

1. Balance sheet / Net worth statement
2. Profit loss statement / income statement

Balance sheet / Net worth statement: Useful for measuring farm business performance.

- ***It is a summary of statement showing the assets, liabilities and net worth or net deficit of a farm business over a point of time. It indicates a snapshot of a farm business on a given date.*** To prepare a balance sheet the prime requisites are

1. Total assets,
2. Total liabilities and
3. Net worth or net deficit of the farm

Assets: Assets are those, which are owned by the farmer.

a)Current Assets: They are very liquid or short-term assets. They can be converted into cash, within a short time, usually one year. For example, cash on hand, agricultural produce ready for disposal, i.e., stocks of paddy, black gram, jowar, wheat, etc.

b)Intermediate or Working Assets: Intermediate assets are less liquid than the current assets. Examples: Machinery, equipment, livestock, tractors, trucks, *etc.*

c) Long-term Assets or Fixed Assets :An asset that is permanent or will be used continuously for several years is called a long-term asset. It takes longer time to convert into cash due to verification of records, legal transactions, *etc. Examples:* Land, farm buildings, *etc.* ***Liabilities:*** Refers to all the things, which are owed to others by the farmer ***a) Current Liabilities:***

Debts that must be paid in the short term or in very near future. Examples:
Crop loans, accounts payable, hand loans, *etc.*

b)Intermediate Liabilities:

These loans are due for the repayment within a period of two to five years. *Examples:* Livestock loans, machinery loans, *etc.*

c)Long-term Liabilities:

The duration of loan repayment is five or more years.

Ex: Tractor loan, orchard loan, land development loan, *etc.*

Net worth or net deficit:

- Shows the difference between the assets and liabilities, and if the difference is positive, it is called net worth (solvency position/ credit worthy/ owner's equity). In case the difference is negative, it is called net deficit (insolvency position).

Solvency ratios: shows the financial liquidity position of farm business.

$$\text{Current ratio} = \frac{\text{current assets}}{\text{Current liabilities}}$$

$$\text{Intermediate ratio} = \frac{\text{current assets} + \text{intermediate assets}}{\text{Current liabilities} + \text{Intermediate liabilities}}$$

$$\text{Net capital ratio} = \frac{\text{Total assets}}{\text{Total liabilities}}$$

Capital per unit of gross income

$$= \frac{\text{Total capital invested}}{\text{Gross income}}$$

Rate of capital turn over

$$= \frac{\text{Gross income}}{\text{total value of farm assets}}$$

Income statement / Profit loss statement

- ***It is defined as a summary of receipts and gains minus expenses and losses during a specified accounting period (usually a year).***
- It is nothing but input and output expressed in value terms.
- Primary function of Income statement is to know the returns and expenses involved in business during given period with resultant of net profit or net loss.
- Income statement basically constitutes three items, *viz.,*

1. Receipts, 2. Expenses and 3. Net income.

Receipts:

They mean the returns obtained from the sale of crop produce and other supplementary products like milk and eggs, wages, gifts, *etc.* Gain in the form of appreciation in the value of assets is also included in the receipts. However, returns from the sale of capital assets, such as livestock, machinery, farm buildings, *etc.* are not included because such returns/income are not really obtained during the period.

- ***Expenses:***

Operating and fixed costs are recorded here. Losses in the form of depreciation on the asset value fall under the expenditure item. However, the amounts incurred on the purchase of capital assets are not considered.

FINANCIAL MEASURES:

- **Net income** = cash receipt – cash expenses

- **Net income**:
  It constitutes net cash income, net operating income and net farm income
- **Net cash income:**
  It gives the position of cash receipts minus cash expenses only during the period for which income statement is prepared.
- **Net operating income** = Gross income – operating expenses

- **Net operating income:** It is arrived at by deducting operating expenses from the gross income. Fixed costs are not given any consideration. Operating expenses include crop loans.

- **Net farm income** = net operating income - fixed cost.

Ratio measures:

i) **Operating cost ratio**

$$= \frac{\text{Operating expenses}}{\text{gross income}}$$

ii) **Fixed cost ratio**

$$= \frac{\text{Fixed expenses}}{\text{gross income}}$$

iii) **Gross cost ratio**

$$= \frac{\text{Gross expenses}}{\text{gross income}}$$

iv) **Cost per acre**

$$= \frac{\text{Total expenses}}{\text{No. of acres}}$$

Capital Budgeting:

Methods of project appraisal:

Broadly two methods of project appraisal

A) ***Undiscounted measures***

1) Ranking by inspection
2) Pay back period
3) Proceeds per rupee of outlay
4) Average annual proceeds of rupee outlay

B) ***Discounted measures***

1) Net Present Worth (NPW)
2) Benefit – Cost ratio (B:C ratio)
3) Internal Rate of Return (IRR)

Undiscounted measures:

1) Ranking by inspection

- It is based on size of cost and length of cash flow stream.
- Suppose two projects with the same investment and the same net value of production, but the difference in the length of the period, then the project with longer duration is preferred to the one with shorter duration.
- Suppose two projects with same investment and net value of production but project A continue to earn longer than the project B then choose project A.
- Suppose two project with same investment and same net value of production but project A earn more in the earlier time sequence than project B, then choose project A.

2)Pay back period :

Pay back period is the length of time required to get back the investment on the project.

$$\text{Pay back period (P)} = \frac{\text{Investment on the project (I)}}{\text{Annual net cash revenue (E)}}$$

Limitations of Pay back period

- Does not take into consistency of running of project
- Not consider time of proceeds
- Not take into account the returns after the pay back period

E.g. Initial investment on Project A & B = Rs 20,000

Years	Cash flow of Project A	Cash flow of Project B
0	-20,000	-20,000
1	5,000	4,000
2	5,000	4,000
3	5,000	4,000
4	5,000	4,000
5	5,000	4,000
6	5,000	4,000

Pay Back period	4 Years	5 Years

* Preference should be given to Project A having lesser pay back period

3)Proceeds per rupee of outlay:

- It is worked out by dividing total proceeds with the total amount of investment
- The given project is ranked based on the highest magnitude of parameter.

Project	Investment (Rs)	Total Proceeds (Rs)	Proceeds per Rupee of out lay	Rank
I	30,000	30,000	1.0	4
II	30,000	34,100	1.14	3
III	30,000	42,000	1.40	2
IV	30,000	45,000	1.50	1

4)Average annual proceeds of Rupee out lay

- In it total receipts are first divided by the project life span
- Then the average proceeds obtained per year divided by initial investment on the project
- Ranking given to the project based on the highest magnitude.

Discounted measures:

1) Net Present Worth (NPW)

- It is simply present worth of net incremental benefit.
- When the present worth of cost is subtracted from the present worth of benefits, NPW obtained.
- NPW calculated as

$$NPW = \frac{P1}{(1+i)^{t1}} + \frac{P2}{(1+i)^{t2}} + \frac{P3}{(1+i)^{t3}} + \ldots + \frac{Pn}{(1+i)^{tn}} - C$$

Where P = Net cash flow
i = Discount rate t
= Time period
C = Initial cost of investment

- If NPW > 0 ---------- Project acceptable/ investment worthwhile
- If NPW < 0 ---------- Project rejected / investment worth while If NPW = 0 ---------- Indifferent case
- Value of NPW should not be negative or zero which make investor indifferent.
- NPW also called as Net Present Value (NPV)

2)Benefit Cost Ratio (B-C ratio)

It measures benefit or returns per unit of cost or investment
Here we compare present worth of costs with present worth of benefits

Present worth of Benefit B-

C Ratio = ---------- = ----------

Present worth of Cost

If *B:C > 1 investment is worth while*

B:C < 1 investment is not worth while

B:C = 1 indifferent case

3)Internal Rate of Return (IRR)

- It is the discount rate at which net present worth is equal to zero i.e. NPW = 0
- It is the maximum interest that a project could pay for the resources used if the project is to recover its investment and operating costs and still break even.

IRR = (i) + (I – i) (p/P-p)

Where i = lower discount rate I = Higher discount rate p =

Present worth of cash flow at lower discount rate

P = Absolute difference between present worth of cash flow at two discount rates