



STORY

A teacher was about to give his first lesson in a school for delinquent boys. As the teacher walked briskly to his desk he stumbled and fell. The class roared in hilarious laughter. The teacher rose slowly, straightened up and said, "This is my first lesson to you: A person can fall flat on his face and still rise up again." Silence descended followed by applause. The message was received.

Thought

A man is but the products of his thought. What he thinks, thus he becomes.

Mahatma Gandhi.

in view

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the editor speaks

Dear Student,

Our mind is a nothing but a bundle of thought. Thoughts are the most potent and main source of our success. We can shape our fate and decide our destiny by our thoughts. However thoughts alone cannot do wonders. In order that our thoughts blossom into success, it should be combined with definiteness of purpose, continuous perseverance and a strong desire pulsating within to translate them into action. Success is thus the fruit of labour and thought. Let us be inspired to be courageous, determined and have strong perseverance to make our goals definite and direct our energies and efforts towards attainment of our goals.

Yours

Abhin Kumar



In the growing and changing world, companies must keep pace with new technologies to provide competitive solutions for their customers. Merely changing along with the growth of technology, however, is not enough. Organizations today confront new markets, new competition and increasing customer expectations. This puts a tremendous demand on manufacturers to:

- (1) Lower total costs in the complete supply chain
- (2) Shorten throughput times
- (3) Reduce stock to a minimum
- (4) Enlarge product assortment
- (5) Improve product quality
- (6) Provide more reliable delivery dates and higher service to the customer
- (7) Efficiently coordinate global demand, supply and production.

Thus, today's organizations have to constantly re-engineer their business practices and procedures to be more and more responsive to customers and competition.

The focus of manufacturing systems in the 1960s was on Inventory control. Most of the software packages then (usually customized) were designed to handle inventory based on traditional inventory concepts.

In the 1970s the focus shifted to MRP (Material Requirement Planning) systems which translated the Master Schedule built for the end items into time-phased net requirements for the sub-assemblies, components and raw material planning and procurement. In the 1980s the concept of MRP-II (Manufacturing Resource Planning) evolved which was an extension to MRP to shop floor and distribution management activities.

MRP-II is a method for the effective planning of all resources of a manufacturing company. It is made up of a variety of linked functions: business planning, sales and operations planning, production scheduling, material requirement planning, capacity requirements planning and the execution support systems for capacity and material. Output from these systems is integrated with financial reports such as the business plan, purchase commitment report, shipping budget and inventory projections.

In the early 1990s, MRP-II was further extended to cover areas like Engineering, Finance, Human Resources, Projects Management, etc. i.e. the complete gamut of activities with any business enterprise. Hence, the term ERP (Enterprise Resource Planning) was coined.

What is ERP?

Enterprise Resource Planning is a collection of software programs which ties together all of an enterprise's various functions HR, finance, manufacturing, sales, etc. ERP software also provides for the analysis of an organization's data for the purpose of planning production, forecasting sales, analyzing quality, and other organizational functions.

The successful deployment of ERP results in an enterprise that has streamlined the data flow between different parts of the business. ERP is an enterprise wide solution. Thus, ERP system gets the right information at

right time to the right people. The main reason for the popularity of ERP is the efficiency that an ERP system brings into an organization in the areas of analysis and reporting that can be used for long-term planning, most efficient use of applications and system resources.

TYPES OF ERP APPLICATIONS

There are three main types of ERP applications: finance, human resource, and manufacturing and logistics. A brief description of the three modules is given below.

Finance

Modules for book-keeping. Some examples are:

- Accounts receivable- Tracks payments from its customers to a company.
- Account payable Schedules payments to suppliers and distributors.
- Treasury management Analyzes and monitors financial deals, investment risk, and cash holdings.
- General ledger Manages centralized sharts of accounts and corporate financial balances.
- Fixed assets Handles costs related with tangible assets, including depreciation.
- Cost control Handles corporate costs related to overhead, products and manufacturing orders.

Bookkeeping involves keeping records on Purchases, Inventory, Sales and other aspects of the organization. This can be done either manually or using readymade software. By using multiple software packages in different departments there is always a problem of inconsistency of data, as the data is entered in various departments and there are multiple entry requirements of the

same record. These records are separately maintained by individual departments of an organization and at the end of the financial year, these records are compiled together to prepare the financial statements (Balance sheets, P&L Account, etc.) of the year. Apart from the inconsistency of data such a system has unnecessary duplication of work. ERP solves the problem of inconsistency and duplication by having one central database which is shared enterprise-wide and is accessed individually by each department. In doing so records need to be entered only once and dependent fields change at once. Proper maintenance of data can thus be achieved through ERP.

Manufacturing and Logistics

A group of modules covers aspects such as taking orders, planning production, and delivering products to the customers. Some examples are:

- Plant maintenance Sets plans and sees upkeep of internal facilities.
- Materials management Manages inventory stocks and controls purchasing of raw materials.
- Production planning Handles daily production schedules and performs capacity planning.
- Order entry processing automates the data entry processes of customer orders and keeps track of the status of orders.
- Warehouse management Arranges, schedules, and monitors delivery of products to customers via different modes of transport.
- Project management Monitors costs and schedules on different projects.
- Customer service management

Administers service agreements and checks warranties and contracts when customers ask for service.

Human Resources

Software for handling personnel-related tasks for corporate managers and employees. Some examples are:

- Human resources administration Automates personnel management processes such as recruitment, vacations, and business travel.
- Payroll Takes care of accounting and preparation of checks related to employee salaries, wages, and bonuses.
- Self-service HR Lets employees change their personal information and benefit allocation on-line;

Advantages OF ERP

The advantages of an ERP system include.

- Elimination of redundant data and procedural operations.
- Flexibility to allow for customization.
- Easier access to reliable information company-wide.
- Compulsive use of best practices because of software.
- Increased efficiency, hence reduced costs
- Adaptability to a changing business environment.
- Reduced cycle times.
- Functional interaction among various modules.

Disadvantages OF ERP

Disadvantages of ERP system include.

- Expensive and Time taking to implement.
- Time consuming and costly maintenance.
- Commitment to a single vendor.
- Availability of multiple options the

might lead to use of features by employees that may not help the company to move towards profitability, high quality, and efficiency.

While an organization can have a custom-built package to meet its requirement, there are some off-the-shelf ERP products that are available in the market like Oracle Applications, BaaN, SAP, Navision. Maconmy, Jeeves. Concorde XAL, IFS Applications, Aggressor, Visma Business, Scale, etc. These systems are designed in such a way that they easily integrate with the prevailing system of an enterprise. By being flexible and uniform packages, these ERP systems need to be customized when implemented in a particular organization.

The success of an ERP solution depends on how quickly the benefits can be reaped from it. This necessitates rapid implementations which lead to shortened ROI periods. Traditional approach to implementation has been to carry out Business Process Re-engineering exercise and defined "TO BE" model before the ERP system implementation. This led to mismatches between the proposed model and the ERP functionality, the consequence of which was customizations, extended implementation time-frames, higher costs and loss of user confidence.

ERP System - The Future

The Internet represents the next major technology enabler which allows rapid supply claim management between multiple operations and trading partners. Most ERP systems are enhancing their products to

become "Internet Enabled" so that customers worldwide can have direct access to the supplier's ERP system. ERP systems are building in the Work flow Management functionally which provides a mechanism to manage and control the flow of work by monitoring logistics like workload, capacity, throughout times, work queue lengths and processing times.

ERP systems are an expensive investment for a company and failure to thoroughly investigate an ERP system before implementation could have serious implications for a business. Before the enterprise implements ERP it should first check (1) Functional fit with the company's business processes (2)

Degree of integration between the various components of the ERP system (3) Flexibility and scalability (4) Complexity: user friendliness (5) Quick implementation; shortened ROI period (6) Ability to support multi-site planning and control (7) Technology; client/server capabilities, database independence security (8) Availability of regular upgrades (9) Amount of customization required (10) Local support infrastructure (11) Availability of reference sites (12) Total cost, including cost of license, training, implementation, maintenance, customization and hardware requirements. □

INTERPRETATION OF STATUTES

Cont'd from Nov 08 Issue

By Prof Rajesh Tayal

When Parliament has enacted a statute as recommended by the report of a committee and there is ambiguity or uncertainty in any provisions of the statute, the Court may have regard to the report of the committee for ascertaining the intention behind the provisions [Davis V, Johnson (1978) 1 All. E.R. 1132 (H.L.)] But where the words used are plain and clear, no intention other than what the words convey can be imputed in order to avoid anomalies.

3. Reference to other Statutes: It is well established that a statute must be read as a whole as words are to be understood in their context. Extension of this rule of context, permits reference to other statutes in *pari materia* i.e. statutes

dealing with the same subject matter or forming part of the same system.

The meaning of the phrase *pari materia* has been explained in an American case in the following words; 'Statutes are in *pari materia* which relate to the same person or thing, or to the same class of persons or things. The word *pari* must not be confounded with the words, *similis*. It is used in opposition to it intimating not likeness merely, but identify it is a phrase applicable to public statutes or general law made at different times and reference to the same subject. When the two pieces of legislation are of differing scopes, it cannot be said that they are in *pari materia*.

It is a well accepted legislative practice to incorporate by reference, if the legislature so chooses, the provisions of some other Act in so far as they are relevant for the purposes of and in furtherance of the scheme and subject of the Act.

Words in a later enactment cannot ordinarily be construed with reference to the meaning given to those or similar words in an earlier statute. But the later law is entitled to weight when it comes to the problem of construction.

Generally speaking, a subsequent Act of a legislature affords no useful guide to the meaning of another Act which comes into existence before the later one was ever framed. Under special circumstances the law does, however, admit of a subsequent Act to be resorted to for this but the condition, Under which the later Act may be resorted to for the interpretation of the earlier Act are strict. Both must be laws on the same subject and the part of the earlier Act which is sought to be construed must be ambiguous and capable of different meanings.

Although a repealed statute has to be considered, as if it had never existed, this does not prevent the court from looking at the repealed Act in *pari materia* on a question of construction.

The regulations themselves cannot alter or vary the meaning of the words of a statute, but they may be looked at as being an interpretation placed by the appropriate Government department on the words of the statute. Though the regulations cannot control construction on the Act, yet they may be looked at, to assist in the

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interpretation of the Act and may be referred to as working out in detail the provisions of the Act consistently with their terms.

4. Dictionaries: If a word is not defined under the Act itself, it is permissible to find out the general sense in which that word is understood in common parlance and if the word is found to be carrying more than one meaning then regard must always be had to the context as it is a fundamental rule that "the meanings of words and expressions used in an Act must take their colour from the context in which they appear." Further, judicial decisions expounding the meaning of words in construing statutes in *pari materia* will have more weight than the meaning furnished by dictionaries.

5. Use of Foreign Decisions: Use of foreign decisions has been permitted by Indian Courts but the assistance of such decisions is subject to the condition that prime importance is always to be given to the language of the relevant Indian statute, the circumstances and the setting in which it is enacted and the Indian conditions where it is to be applied.

6. Usage: Usage is also sometimes taken into consideration in construing an Act. The acts done under a statute provide quite often the key to the statute itself. It is well known that where the meaning of the language in a statute is doubtful usage-how that language has been interpreted and acted upon over a long period-may determine its true meaning. It has been emphasized that when a legislative measure of doubtful meaning has, for several years, received an interpretation which has generally been acted upon by the public, the Courts should be very unwilling to change that interpretation, unless they see cogent reasons for doing so. Thus both definitional sections and clauses, and usage are helpful in the construction of a statute.

Importance of Usage : Usage is one of the classes of external circumstances which has in peculiar circumstances, been sometimes taken into consideration in constructing a statute. It consists of acts done under it, for usage may determine the meaning of the language when the meaning is not free from ambiguity. When a statute uses language of doubtful import, the way of acting upon it for a long term of years may well give an interpretation to that obscure

meaning and reduce that uncertainty to a fixed rule. In other words, when a legislative measure of doubtful meaning has for several years received an interpretation which has generally been acted upon by the public, the Court should be very unwilling to change that interpretation, unless they see cogent reasons for doing so. This rule applies more strongly, where the measure relates not to any general principles of law, but to some technical or fiscal rules (such as the registration of documents). A Latin maxim in this regard suggests that the custom is the best interpreter of the law.

Interpretation of certain words

1. 'And includes': This is a phrase of extension and not a restrictive definition. It imports addition. Therefore, when in an interpretation clause it is stated that a certain term includes so and so it is implied that the term retained its ordinary meaning, whatever it may mean. It is only an extended force and does not limit the meaning of the term to the substance of the definition.

2. 'And includes': It is only an extended force and does not limit the meaning of the term to the substance of the definition. It imports addition. Therefore, when in an interpretation clause it is stated that a certain term includes so and so it is implied that the term retained its ordinary meaning, whatever it may mean.

3. 'Means': This word indicates that the definition is a hard and fast definition and that no other meaning

can be imputed to the expression than that which is put down in the definition.

4. Denotes: In such a case the definition in the interpretation clause does not purport in the strict sense to be a definition of the particular word. The interpretation here is just opposite to the use of the word 'means'.

5. 'may', 'must' or 'shall':

The word 'shall' does not by itself make a provision of the act mandatory. It has to be construed with reference to the context in which it is used.

The word 'may' in a statutory provision would not by itself show that the provision is directory in nature. In order to interpret the legal import of the word 'may', various factors have to be considered e.g. the object and scheme of the Act, the context or background against which the words have been used. The purpose and advantage of the Act sought to be achieved by use of this word and the like.

'May' also involves a discretion coupled with an obligation or where it confers a positive benefit to general class of subjects or in an utility act, or where the Court advances a remedy and suppresses the mischief or where giving the word a directory significance would defeat the very object of the Act then the word 'may' should be interpreted to convey a mandatory force.

Where discretion is conferred upon a

public authority, coupled with an obligation, the word 'may' should be construed to mean a command. Similarly, when an order of the Government or a statute confers power on an authority, in discharge of a public duty and though such power appears to be permissive, it is imperative that authority should exercise that power in discharge of its duties.

The word 'may' is after read as 'shall' or 'must' when there is something in the nature of the thing to be done, which makes it the duty person on whom the power is conferred to exercise the power. No general rule can be laid down for deciding whether any particular provision in a statute is mandatory, meaning thereby that non-observance thereof, involves the consequences of invalidity or only directory, i.e., discretion, non -observance of which does not entail the consequence of invalidity, whatever other consequences may occur. But in each case the Court has to decide the legislature's intent.

The use of expression 'shall' or 'may' is not decisive. Having regard to the context the expression 'may' has varying significance. The some context, it is purely permissive, while in others it may confer a power and make it obligatory upon the person vested with power to exercise it as laid down.

- When a statute uses the word 'shall' prime facie it is mandatory but it is sometimes not so interpreted in the context or intention otherwise demands. Thus, under certain circumstances the expression 'shall' is construed as 'may'.
- The term 'shall' in its ordinary significance, is mandatory and the Court shall ordinarily give that interpretation to that term, unless such an interpretation leads to some absurd or inconvenient consequences or be at variance with intent of the legislature to be collected from other parts of the Act.

Mandatory and directory requirements : Whether a particular requirement prescribed by a form is mandatory or directory may have to be decided by each case having regard to the purpose or object of the requirement and its interrelation with other enacting provision of the statute; and it is difficult to lay down any uniform rule. Where forms prescribed under rules become part of rules and the Act confers an authority prescribed by rule to frame particulars of an application form, such authority may exercise the power to prescribe a particular form of application.

6. Notwithstanding

The words 'notwithstanding anything contained' characterize the non-obstinate clause. These words give an overriding effect to the clause over the other. If there is any consistency between the non-obstinate clause and another provision, it is the non-obstinate clause, which will prevail. (K. Parasuamalah .

V.Pakari Lakshman, A/R 1965 AP 220).

Examples:

- Section 77 prohibits a company from buying its own equity shares. Section 77A beginning with the words “Notwithstanding anything contained in this Act....” authorizes company to buy back its own equity shares.
- Section 79 prescribes certain conditions for issue of shares at discount. Section 79A beginning with the words “Notwithstanding anything contained under section 79.....” authorises a company to issue equity shares as sweat equity at any price.
- Section 81 (1) authorises a company to make further issue of share capital by offering shares on right basis only. Section 81 (1, A) beginning with the words “Notwithstanding anything contained under sub-section (1)....authorises a company to issue further capital otherwise than right.
- Section 408 beginning with the words “Notwithstanding anything contained in this Act....” Vests overriding powers in the Government to nominate directors to prevent mismanagement or Oppression (Oriental Industrial Corporation Ltd.vs. Union of India (1981) 52 Com Cases 487,493 (Del).This expression indicates that the appointment of directors under this section is not

to be controlled by the maximum number or other proportion, it any, fixed by any provision of the Act. Further, they cannot be removed by the company at general meeting under section 284 of the companies Act.

7. Subject to

The words 'subject to' convey the idea of a provision-yielding place to another provision or provision to which it is made 'subject to'

Examples

- Subsection (2A) of section 283 starting with the words “Subject to provision of sub-section (1) and (2).....” provides for penalty where a director continue in the office despite automatic vacation of office under sub-section (1) and sub-section (2) provides for penalty where a director continue in the office despite automatic vacation of office under sub-section (1) and sub-section (2) provides for filing of appeal in

certain cases. Combined reading of sub-section (1),(2) and (2A) means that where a director has incurred a disqualification referred under sub-section (1), his office gets vacated provides he not filed any appeal within the time stipulated under sub-section (2) and if appeal has been filed and it is pending then penalty prescribed under sub-section (2A) will not be attracted.

- Section 291 begins with the words “Subject to provisions of the Act...” This section authorises the Board of directors of a company to do every thing that a company can do but due to opening words, the Board of Directors cannot take a decision of a subject matter which is required to be approved by members in a general meeting only. ■



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PRODUCTION AND PRODUCTION FUNCTIONS

By Harsh Thakur

Production : Production means the creation of physical product. Classical economists such as Adam Smith, Kari Marx etc, were of the opinion that production of service is not included in purview of production. Modern economists do not agree with this concept. According to them, man can neither produce a physical product nor he can destruct it. He can change only the form of physical product. He can not produce a product, he can create utilities only. Thus production means the creation of utilities. Any activity that makes a product more is called production.

According to Fraser: "If consuming means extracting utility form, producing means putting utilities into".

According to Marshall: "Man cannot create material things, in mental and normal world indeed he may produce new ideas when he is said to produce material things he really produce utility."

Factor of Production : A factor of production may be defined as that good or service which is required for production. A factor of production is indispensable for production because without it no production is possible. Input of production are classified into factors of production. They are broadly classified into four factors of production.

1. Land
2. Labour
3. Capital
4. Entrepreneurship

1. Land: Land is primary or basic factor of production without which no production is possible. The term "Land"

in economics is often used in wider sense. It does not mean only the surface of the soil but it also includes are those natural resources which are free gift of the nature. It, therefore, means all are free gift of the nature. These natural gift include rivers, forest, mountains, and oceans, sun, rainfall etc. According to Marshall "By land is meant..... materials and forces which nature gives freely for man's aid in land, water, air, light and heat." Therefore land is stock of free gifts of nature.

2. Labour: Labour includes both physical and mental work undertaken for some monetary reward. In this way, workers working in factories service of doctors, advocates, officers are all included in labour.

Any physical or mental work which is not undertaken for getting income, but simply to attain pleasure or happiness, is not labour. For example, if a mother bring up her children, a teacher teach his son and doctor treat his wife, these activities are not considered labour.

3. Capital : In the modern industrial system, capital occupies a pivotal position. Capital refers to the stock of capital assets such as factories, machines, tools and equipments etc. These things are produced by man. Thus capital is man-made resource of production. Capital

is therefore commonly defined as produced means of production. Colin Clark, described capital as produced wealth used for the purpose of production.

4. Entrepreneur : The process of any production is stimulated, unified and completed by an appropriate organization. Enterprise stimulate production by bringing together the other three factors. The person who runs an enterprise is called an "entrepreneur". Thus an entrepreneur meant a person who brings the other factors of production in an organised way.

Nature of production Function: The nature of production function is as follows:

1.The factors of production are also complementary to one another, that is, the two or more inputs are to be used together as nothing will be produced if the quantity of other of the inputs used in the production process is zero.

The principle of returns to scale is another manifestation of complem-entary of inputs as it reveals that the quantities of all inputs are to be increased simultaneously in order to attain a higher scale of total output.

2.The factors of production or inputs are substitutes of one another which make it possible to vary the total output by changing the quantity of one or few inputs, while the quantities of all other inputs are held constant. It is the substitutability of the factors of production that gives rise to law of variable proportions.

3.Specificity reveals that the inputs are specific to the production of a particular product. Machines and

equipments, specialised workers and raw materials are a few examples of the specificity of factors of production. The specificity may not be complete as factors may be used for production of other commodities too. This reveals that in the production process none of the factors can be ignored and in some cases ignorance to even slightest extent is not possible if the factors are perfectly specific.

Managerial Uses of Production Function :

Though production may be seen to highly abstract and unrealistic, in fact it is both logical and useful. If the price of a factor of production declines whereas that of another goes up, the former is likely to substitute the latter. The usefulness of the production function can be explained with the help of an example. Dairy economists, for instance are interested in minimizing the cost of feeding cows in milk production. Talking a cow as a single firm, and grain and roughage as inputs the question arises what proportion of grain and roughage would be economical in feeding the cow. In the past, there has been some tendency to prescribe a fixed ratio, but economic analysis suggests that the optimal ratio depends on the input prices. For instance, if we draw iso-quants relating various quantities of grain and roughage to various levels of milk output and then superimpose iso-cost lines on the iso-quant diagram, the optimum, the point of largest output for a given outlay or of minimum

outlay for given output would depend on the prices of the factors of production, and it would change as these prices change. The dairy farmer can use such analysis for increasing the return from his expenditure on feeds.

Certain economists have devoted special attention to the application of their findings. For instance, Earl Heady and his associates have developed a mechanical device known as Pork Costulator which facilitates the former to determine the most profitable ratio for feeding lags under different price conditions.

Production function, thus, are not just theoretical and useless devices. On the other hand, theory can be used as aids in decision making because they can give guidance in two condition (i) how to obtain the maximum output from a given set of inputs and (ii) how to obtain a given output from the minimum aggregation of inputs. Of course, in more complex problems, with longer numbers of inputs and outputs, the mathematics of optimisation becomes complicated. But recently, the development of linear programming has made it possible to handle these complex problems. The use of complex production functions in managerial decision making is going to be further facilitated with the development of electronic computers.

Types of Production Functions : Production functions may take the following forms:

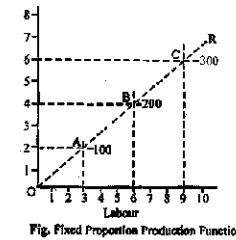
- (a) Fixed proportion production function
- (b) Variable proportion production function

(c) Linear homogeneous production function

(d) Cobb. Douglas production function

(a) Fixed Proportion Production Function: In fixed proportion production function, the factors of production are used in definite fixed proportions. For instances, a fixed number of workers may be required to produce a unit/units of the product and this proportion can not be varied by substituting one factor for other factors. In the case of variable proportions production function, the technical co-efficient of production is variable. In other words, the quantity of a factor of production required to produce a given unit of product can be varied by substituting some other factor/factors in its place. This means that in this case a given quantity of a product can be turned out by several alternative combinations of factors of production as shown in a iso-quant map. Suppose we require 40 workers to produce 200 units of a product, the technical co-efficient of production in this case is 1/5. In case the technical co-efficient of production is fixed then in a case this one fifth of labour must be employed for the production of a unit of the commodity in question and there is no scope for varying its production through substitution of some factors. This is the case of fixed proportion production function in which the factors of production, e.g. labour and capital must be used in fixed proportion in the production of a certain level of output.

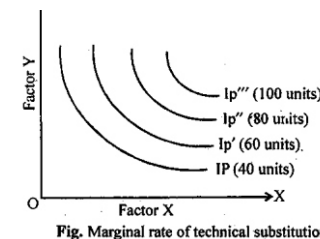
The fixed proportions production function can be illustrated by the help of the Fig.



In the given Fig. OR represents the fixed labour capital ratio. This ratio must be maintained whatever be the level of output. Since this ratio is fixed, the iso-quants relating to such a production function are shown at right angles. Suppose the ratio is 2/3, 2 units of capital and 3 units of labour.

When 100 units of product are to be produced, then for units producing zero units, 4 units of capital and 6 units of labour will be required, and so on. It may be noticed that along each iso-quant, the marginal product of a factor is zero. For instance, at β an iso-quant of 200 if the amount of capital used is fixed, the use of extra labour makes no addition to the total production i.e. the marginal product of labour is zero. However, doubling both factors will result in doubling the output, and so on.

(b) Variable Proportion Production Function : Variable proportion production function can be illustrated by the iso-quant map given in the Fig..



In this case, the ratio in which the factors of production are used is not fixed

but it is variable. That is, a given quantity of the product can be produced by several alternative combinations of factors. In the iso-quant map various equal product curves are drawn to show how different combinations of factors of technical substitution production can be used to produce a given level of output.

(c) Linear Homogeneous Production Function : The linear homogeneous production function implies that if all the factors of production are increased in some proportion, the output also increases in the same proportion. That is, the doubling of all inputs will double the output and tripling them will result in the tripling of the output, and so on. This represents a case of constant results to scale. This type of production function is called by the economists as a well behaved production function because it can be handled and used in empirical studies. It can be used by computers in calculations. That is why it is widely used in linear programming and input-output analysis. It is also extensively used in model analysis of production, distribution and economic growth.

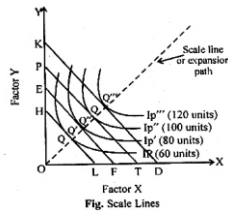
This is function which is homogeneous of the first degree. That is, it shows that the increase in output in some proportion follows a given change in the factors of production. This has been put mathematically as

$$MP = f(MX, MY)$$

Here, M is any number and P stands for the total production of the production or it can be expressed as

$$PM^K = f(MX, MY)$$

Here M is any number and K means constant. This function is homogeneous of Kth degree. If K is equal to one, then this homogeneous function is homogeneous of the first degree and if K is equal to two it is homogeneous of the second degree, and so on. If K is greater than one, the production function gives, increasing returns to scale and if it is less than one it gives decreasing returns to scale. In the case of homogeneous production function, the expansion is always a straight line through the origin (see Fig.). This means that in the case of homogeneous production function of the first degree, given constant relative factor prices, the proportions between the factors used will always be the same whatever be the level of output. This makes the task of the entrepreneur easy. Having hit on an optimum factor proportion, he need not change the decision so long as the relative prices of the factors remain unchanged.



(d) Cobb-Douglazs Production Function :

Many production function have been examined by economists to measure relationship between changes in physical inputs and physical output. A famous statistical production function is the one associated with the names of Professor C.W. Cobb and P.H. Douglas.

The Cobb-Douglas production function is based on the empirical study of the American manufacturing industry made by Senator Paul H. Douglas and

C.W. Cobb. It is a linear, homogeneous production function of the first degree which takes into account only two inputs-labour and capital for the entire output of the manufacturing industry. The Cobb-Douglas Production function is

$$P = KL^a C^{1-a}$$

Where 'P' is output 'L' is the amount of labour, 'C' is capital employed and 'K' and 'a' are positive constants, where $a < 1$. The production function solved by Cobb-Douglas had 3/4 contribution of labour to the increase in manufacturing industry and 1/4 of capital. Thus, the Cobb-Douglas production function is

$$P = KL^{3/4} C^{1/4}$$

Which shows constant return to scale because the total of the values of L and C is equal to one (3/4+1/4). To prove it let us increase the quantities of labour and capital by 'g' items then output :

$$\begin{aligned} P &= K(gL)^a (gC)^{1-a} \\ &= K(g^a L^a)(g^{1-a} C^{1-a}) \\ &= Kg(L^a)(C^{1-a}) \\ &= gKL^a C^{1-a} \\ &= gP \end{aligned}$$

Thus, the output 'P' has become 'gP' when the inputs are increased by 'g' times. It shows that doubling the inputs, doubles the output. It implies that the Cobb-Douglas Production function is linear and homogeneous.

In the Cobb-Douglas function, the sum of the exponents shows that degree of return to scale in production.

$a + b > 1$ increasing returns to scale

$a + b = 1$ constant returns to scale

$a + b < 1$ decreasing returns to scale ■

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