CHAPTER - III

PRODUCTIVITY MEASUREMENT

AS A MANAGEMENT ACCOUNTING TOOL.

3.1 : Introduction.

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CHAPTER - III

PRODUCTIVITY MEASUREMENT AS A MANAGEMENT ACCOUNTING TOOL

3:1) INTRODUCTION :

The sucess of the business is depends more upon the efficiency of management. The process of management consists of forecasting, planning, organising, staffing, directing and controlling functions. The efficiency of the management depends upon the Management Information System (MIS) techniques which supplies the detailed information well in time as and when required to concerned people. Management accounting is one of the important branch of management which keeps control over the efficiency within the organisation. Management accounting includes the following different techniques which are very useful to measure the efficiency, productivity of the organisation internally.

There are various accounting tools such as standard costing, budgetary control, marginal costing, break even and cost volume analysis, inter-firm comparison, ratio accounting, internal audit, and capital project assessment and control. Management accounting utilises the principles and practices of both cost accounting and financial accounting in the best interest of the business. The main function of management is to control over the business in order to maintain production cost low and high profitability in the safe-guard of share-holders, creditors, investors, etc. Before discussing management accounting

tools, it is necessary to define the concept of management, organisation, productivity and ratio analysis.

3:2) MANAGEMENT :

Management brings together all the factors of production. It is a co-ordinating force. In the words of John. F. Mee -

" Management may be defined as the art of securing maximum results within a minimum of efforts, so as to secure maximum prosperity and happiness for both employer and employee and give the public the best possible service."

Peter F. Drucker says that, "Management is a multi-purpose organisation that manages a business and manages managers and manages worker and work."

According to E.F.L. Brech - " Management is concerned with seeing that the job gets done, its tasks all centre on planning and guiding the operations that are going on the enterprise."

Every organisation whether small or large direction, somebody should be there to guide the organisation, for this purpose, the person or persons responsible have to fix the goal and find out the method and manner in which the goal can be achieved. The person or persons cannot stop at that, but they also have the responsibility of seeing to it that the goal is achieved. All this work is a continuous process and it a part of the management.

The success of an organisation depends upon the efficiency of management in fixing the goal and achieving it.

To achieve its objectives the management has to perform certain functions. As George R. Terry puts it, 'Management is a distinct process consisting of planning, organising, actuating and controlling'.

Management is the technique and science of organising and directing the activities of an enterprise. It is concerned with utilising human efforts and talents to control natural forces and other factors of productivity for the accomplishment of a common objective. It has obviously to deal with persons and also with things, such as money, materials, machines, buildings and lands.

The word management also refers to the persons who organise and direct the activities of an enterprise. Quite often the word 'Administration' is used synonymously with the word 'Management'. Administration is generally concerned with determining the kind of business or other enterprise to be established, the product to be manufactured and sold and other general policies. Management, on the other hand, endeavoures to accomplish the objectives of the enterprise and to put into effect the policies established by the administration.

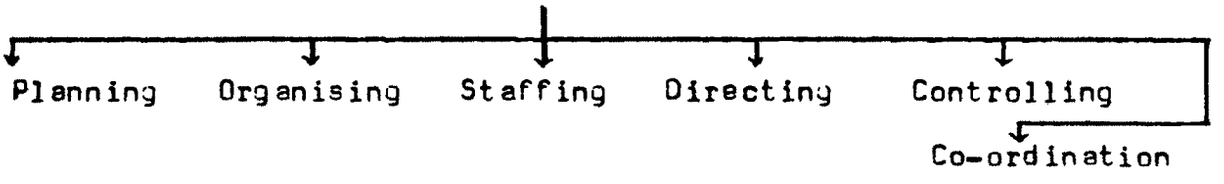
The success of a sugar factory has to be measured by the returns it brings to its shareholders, workers and all those connected with the enterprise directly or indirectly. Every enterprise has so lay down its broad objectives. Generally speaking the objectives of an enterprise would be productions of goods

and services for the satisfaction of human wants, providing employment for the workers, to avoid waste of natural resources and to aid the nation in defence and other social welfare activities.

The functions of management are many in number and may be classified as follows :

CHART NO. 2

Functions of Management



F.W. Taylor, aptly regarded as the father of scientific management emphasised the need for scientific approach to management and management to know the work and teach the workers the best method of doing the work. Henri Feyol narrated the principles of management. Later on many others have contributed to the management thought.

In order to discharge its multifarious and complex responsibilities the manager must take into account the basic elements of scientific management, viz. Planning, Control, Co-ordination and Motivation.

3:3) ORGANISATION :

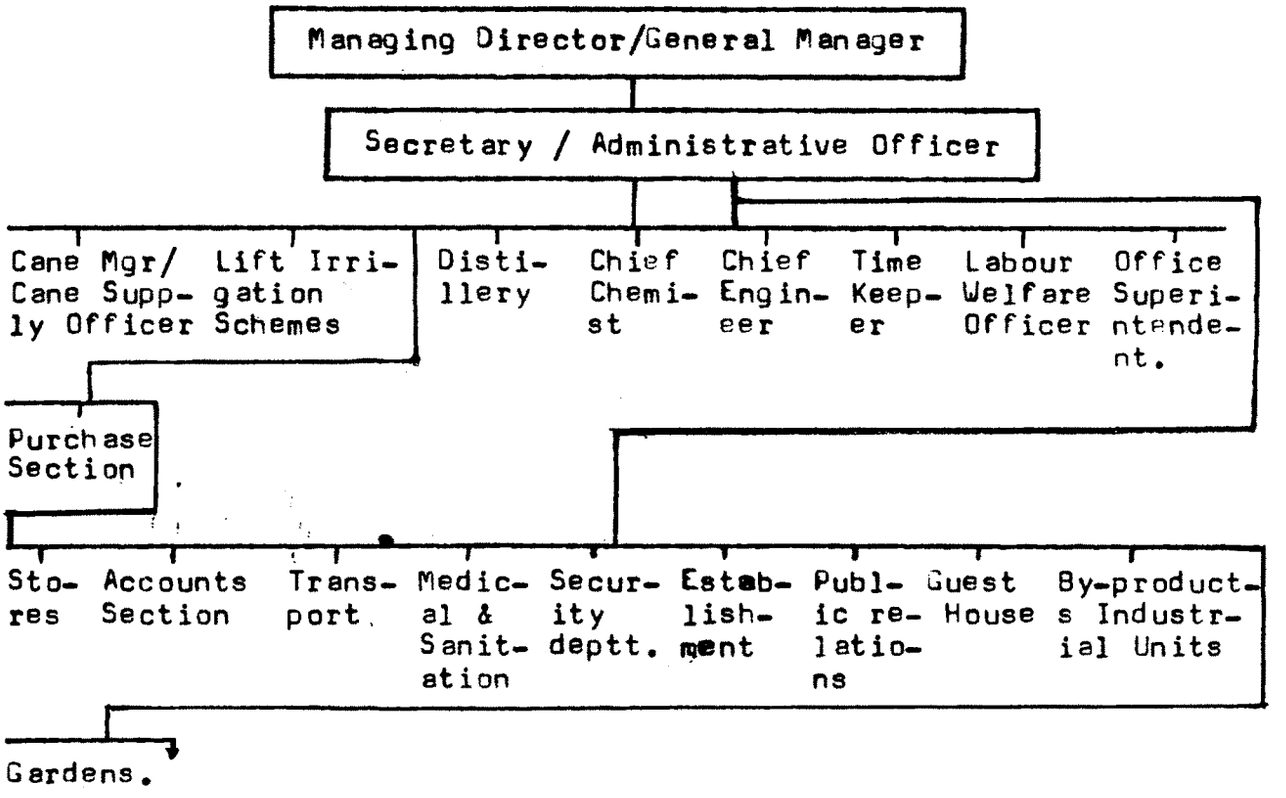
ORGANISATION OF A SUGAR FACTORY

Organisational set-up of a Sugar Factory comprises of a three-tier system or three main sections. 1) Field, 2) Factory and 3) Administration. Though these three sections from managerial approach require distinct operational planning, yet each one is so interdependent and inter-voven with the other for day to day working that one cannot be segregated from other as a distinct compartment.

The set-up of a managerial and supervisory organisation of a sugar factory is given in the Chart No.3.

CHART NO. 3

The Organisational (Managerial & Supervisory) set-up of Sugar Factory



Sub-Committees :

The board of directors in exercise of the powers vested in it under bye-law of the sugar factory, may appoint different sub-committees, for facilitating the work of the different activities. Such committees are classified as under.

1. Agricultural Committee.
2. Purchase Committee.
3. Works Committee.
4. Transport Committee.
5. Accounts Committee.
6. Labour Committee.
7. Distillery Committee.
8. Lift Irrigation Committee.
9. Hybrid Committee.
10. Paper or any other by-product sub-committee.

The minutes of meetings of these committees may be placed before the board of directors for confirmation.

The general office of a co-operative Sugar Factory is sub-divided into 16 branches as under.

1. Secretarial Section headed by secretary and P.A. to managing director/manager and general administration.
2. Office Superintendent, head clerk and correspondence section,
3. Purchase Section 4. Stores 5. Sugar Godown
6. Time Office 7. Labour & Welfare 8. Guest House
9. Transport 10. Medical & Sanitation 11. Watch & Ward
12. Sales 13. Public Relations 14. Establishment
15. Accounts Section 16. Cane supply Section.

3:4) PRODUCTIVITY :

Meaning & Definitions :-

Productivity is the major goal of all organisations. It is crucial to the survival of an organisation thus management attempts to reach optimum levels of productivity by using various methods such as financial and non-financial incentives, changing supervisory methods to more democratic and participatory styles or both and sometimes using coercive factics.

The term productivity connotes different meanings to experts from different disciplines. To macro-economists it is an indice aggregated at the level of the economy as a whole. To micro-economists and macro-oriented management theorists, productivity is specific to industrial firms and organisations. Productivity has been studied by industrial engineers and behavioural scientists for a considerable period of time.

The terms productivity and performance have been used interchangeably by psychologists to refer to variables which include output, quality and turnover. In general, productivity can be conceptualized as the final outcome of the interaction between performance and satisfaction.

Performance is the outcome of three major sets of variables. Human (individual), Human (Social) and Non-human. These are listed as below.

C H A R T N O. 4

Productivity

or

Performance

Human (Individual)	Human (Social)	Non-Human
A. Skills/abilities	A. Social System	A. Machines/Tools /equipments.
B. Personality	B. Organisational System	B. Raw Materials
1. Motivation	C. Teams	C. Energy
2. Porceptions	D. Dyadic relationships	D. Finance etc.
3. Attitudes		
C. Trainability		
D. Integrative Systems-		
1. Central Nervous System (CNS)		
2. Sensory Mechanisms.		

Since productivity is so important to organisations, planning for better results is a very important component in productivity. The planning process occupies three stages.

1. Preparation 2. Planning 3. Performance

Productivity is broadly defined as the ration between output and total input of factors required to achieve it. Being a directly non-measurable phenomenon it is always quantified in terms of a ratio. Thus productivity of capital-fixed or working capital such as fuel, raw material and labour can be quantified in terms of a ratio between relevant

input and output factors.

We have so far been talking about productivity, but let us define productivity to understand the term right and properly. There is no clear and unique definition of the term productivity. Some of the definitions in this regard include:

£Evan Claugue :- Productivity expresses the overall efficiency with which our industries perform.

£Russel W. Fensake :- According to Fensake productivity is-

a) a form of efficiency,

b) utilisation of resources or effectiveness of utilisation of resources,

c) it is a ratio rather than a phenamenon;

d) is a measure of some kind rather than variable requiring management and

e) rate of return primerily in monetary terms.

£J. M. S. Risk :-

J.M.S. Risk in 'Management in Competitive Planned Economy' has said that -

" Productivity is a physical ratio related to quantity of goods produced or services given in comparison with the quantity of resources consumed".

Variety of resources consumed when converted into money terms still represent all physical factors.

£ Industrial Economy by H.R. Mukhi, New Heights Publication 1978 Pp. 93

£International Labour Office :-

ILO has defined productivity - " the ratio between the output and one of the factors of input is generally known as productivity of the factor considered".

£Prof. S. C. Kuchhal :-

" Productivity implies development of attitude of mind and a constant urge to find better, cheaper, quicker, easier and safer ways of doing a job, manufacturing a product and providing a service. It aims as the maximum utilisation of resources for yielding as many goods and services as possible, of the kinds most wanted by consumers, at the lowest possible cost".

Though different definitions of the term productivity have been given, yet the one given by ILO is considered as the most suitable one. About Evan Claugue's definition it is said that it makes it impossible to express productivity in quantitive terms to be of any use.

About Risk's definition the difficulty expressed is that, this definition does not help in comparing two units where the monetary value of the money changes according to exchange rate. About ILO definition, Prof. Kuchhal is of the view that, " Popularity of this definition, undoubtedly rests on the wide-spread interest in labour saving because such saving can effect costs, prices, jobs, wages and even a nations military security and level of living". This views

has been supported by H. S. Davis in his "Meaning and Measurement of Economy".

Productivity is an index of efficiency showing the effectiveness of the individual or combined factors used in producing goods or services. Productivity is thus the power to produce and indicate the capacity for growth and all material progress of the business. Men, Machines, Materials, Capital, Power and Services all contribute to productivity and the extent to which each does so may be ascertained by the ratio of output to input. The output may be expressed in terms of quantity, sales value or cost and the input may be expressed in terms of quantity, weight of materials, hours worked or money value of each or combined factors of production. It may be mentioned that the greater the fraction of total cost which a factor of production represents, the more important will it be to ensure that the productivity of that factor is fully exploited. Whete labour presents a major portion of total cost measurement of productivity of labour is essential. In highly mechanised factories, machine productivity i.e. machine utilisation is highly desirable.

Though productivity is measured by the ration of output to input, an idea of increased productivity is optained when losses are minimised and consequently cost of production is reduced, Thus, productivity can also be expressed as a ratio of loss (e.g. idle time, was tage of material, etc.) to total quantity used or manufactured. It is also necessary

to study the technicues of productivity measurement. Accounting ratio is the best technique of productivity measurement, so it is necessary to clear the concept of account ratio.

3:5) ACCOUNTING RATIOS :-

Ratio is expressed in terms of relation and percentage also.

Accounting ratios are ratios that describe the significant relationship which exists between figures on a Balance-sheet, Profit and Loss Account and in other parts of accounting organisation. These ratios are of great value in determining the financial position and efficiency of the business, supplying valuable information to management to assist them in planning, policy making and controlling the activities, in establishing standard costing and budgetary control and in all branches of management accounting. These accounting ratios may also be valuable in determining the financial relationship between the business and the various classes of shareholders and other providers of capital, employees, suppliers, customers and other members of the industry, the Government and the nation as the whole. Moreover, ratios may be useful in facilitating or eliminating routine checking, in assessing the validity of general results, in report presentation and in interpretation and criticism of final accounts.

It is clear that accounting ratio is the technique of productivity measurement or we may say productivity is

measured in terms of ratio. Researcher selected the various ratios relating to following factors to measure the productivity.

1. Labour Productivity.
   a) Lost Time Percentage
2. Machine Productivity.
3. Material Productivity.
4. Capital Productivity.
   a) Proprietor's Ratio.
   b) Capital Employed to fixed Assets Ratio.
   c) Current Ratio.
   d) Current Assets to Fixed Assets Ratio.
   e) Capital Gearing Ratio.
   f) Liquid Ratio.
5. Power and Services Productivity.
6. Return on Capital Employed Ratio.
7. a) Gross Profit to Sales Ratio.
   b) Net Profit to Sales Ratio.
   c) Net Profit to Fixed Assets Ratio.
   d) Net Profit to Net Worth Ratio.
   e) Stock Turnover Ratio.
7. Other Productivity.
   a) Cost of Sales to Sales Ratio.
8. Total Productivity.

1) Labour Productivity :-

Where most of work is done by hand labour, measurement of labour productivity is essential, Usually, all factory labour, both direct and indirect should be included.

a) Interms of hours :- The most widely accepted definition of labour productivity is output per man hour.

$$\text{Productivity} = \frac{\text{Output}}{\text{Actual man hours}}$$

i) $$\text{Lost time percentage} = \frac{\text{Man hours lost}}{\text{Actual man hours}} \times 100$$

b) In terms of Revenue :- Among other ratios for measuring productivity, a common one is

$$\frac{\text{Sales Value of Output}}{\text{Number of Workers.}}$$

Another measure of quantifying labour productivity is --

$$\frac{\text{Direct Wages}}{\text{Sales Value}} \text{ or } \frac{\text{Indirect Wages}}{\text{Direct Wages}} \text{ or } \frac{\text{Direct Wages}}{\text{Sales Value}} \text{ or } \frac{\text{Direct Wages}}{\text{No.of Units}}$$

Productivity of labour can, therefore be increased by increasing efficiency of labour, reducing idle time and improving the working conditions of labour and undertaking effective labour welfare schemes.

2) Machine Productivity :-

In a highly machanised factory, capacity utilisation of machinery is more important than full utilisation of other factors. Machine productivity is determined by --

i) $\frac{\text{Output}}{\text{Actual Machine hours}}$

ii) Activity percentage $= \frac{\text{Actual Machine hours}}{\text{Planned Machine hours}} \times 100$

iii) Machine effectiveness $= \frac{\text{Net machine running time} + \text{Setting up time}}{\text{Total working hours of plant Group}}$

iv) Lost time Percentage $= \frac{\text{Machine hours lost}}{\text{Planned Machine Hours}}$

3) Material and Purchase Productivity :-

In case of new product, a good design may reduce the wastage and excess usage of material. At the operation stage, higher productivity is achieved by using, minimum material with the help of skilled wormanship, adequate machine tools and quality and efficient purchases. An idea of productivity can be obtained from the following ratios :

a) Material Productivity :-

$\frac{\text{Material cost}}{\text{No.of Units produced}}$ $\frac{\text{Direct Material Cost}}{\text{Production Cost}}$

Indirect Material Cost / Direct Material Cost	Direct Material Cost / Sales
Direct Material Cost / NO.of Employees	Rejected/Waste/Scrap / Total Material Consumed

b) Purchase Efficiency :-

Purchase efficiency can be measured by the following ratios.

Actual Purchase Price / Budgeted Purchase Price	Purchases in Current period / Purchases in Previous Period
Purchase Return / Total Purchases	Purchase cost/Trade Discount earned / Total Purchases

4) Capital Productivity :-

For measuring capital productivity following ratios are essential.

i) Proprietors' Ratio :- It is the ratio of funds belonging to shareholders to the total assets of the company. 'Funds belonging to shareholders' means share capital share Anamat plus reserves and other funds. Higher the ratio better it is for all concerned. It is worked out as :

$$\text{Proprietor Ratio} = \frac{\text{Proprietors' Funds}}{\text{Total Assets}}$$

A fall in this ratio indicates unsatisfactory position because there must be sufficient capital to cover fixed assets, intangible assets, and reasonable working capital

ii) Capital Employed to Fixed Assets : This Ratio is calculated by using the following formula.

$$\text{Capital Employed to Fixed Assets} = \frac{\text{Capital employed}}{\text{Fixed Assets}}$$

iii) Current Ratio :- It is also known as "Working Capital Ratio", since it is related to the working capital. The current ratio compares the total current assets of the business unit to its current liabilities. It is calculated by --

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

This is the ratio of current assets to current liabilities and should be about 2, indicating that current assets are twice the current liabilities.

The current ratio measures short-term solvency which only reflects its ability to meet short-term obligation. The higher the current ratio the greater the business unit's ability to meet current obligations which and the more the safety of funds of the short term creditors.

Current Assets includes Cash in Hand and at Bank, Advances and other Sundry Debtors and Current Assets including Investments.

Current Liabilities includes Current Liabilities and Provisions.

iv) Current Assets to Fixed Assets :

This ratio expresses the relationship between current assets and fixed assets. This ratio is computed by divinding -

$$\text{Current Assets to Fixed Assets} = \frac{\text{Current Assets}}{\text{Fixed Assets}}$$

This ratio will be higher in manufacturing companies than in trading companies. A decrease in the ratio may reveal that trading is slack or more mechanisation has been put through.

v) Capital Gearing Ratio :-

This is the ratio between long term loans and total funds. Lower the ratio, more comfortable is the position of creditors, because it means that they can be called upon to suffer losses only if the losses are exceptionally heavy. It is worked out as :

$$\text{Capital Gearing} = \frac{\text{Long term Debts}}{\text{Equity share Capital}}$$

In this case, the ratio may be "2", indicating that long term loans may be twice the shareholders' funds.

Long term debts includes - Loans and Deposits.

vi). Liquid Ratio :

It is also known as Acid Test Ratio. This ratio is concerned with the relationship between quick assets and quick liabilities and it is intended to supplement

the information furnished by current ratio. It is calculated by dividing the quick assets by the quick liabilities.

$$\text{Acid Test Ratio or Quick Ratio} = \frac{\text{Quick or Liquid Assets}}{\text{Quick or Liquid Liabilities.}}$$

Generally speaking, Liquid ratio of 1:1 is considered satisfactory in as much as for Re.1 of quick liabilities there are quick assets worth Re.1. This only means that the business concern from and out of its quick assets would meet all its quick liabilities without any difficulty.

Quick Assets includes Cash in Hand and at Bank, Advances and other Sundry Debtors and Current Assets.

Quick Liabilities includes Current Liabilities and Provisions.

5) Power and Services Efficiency (Productivity) :-

This Ratio is calculated by using the following formula :

$$\text{Power and Services Productivity} = \frac{\text{Maintenance Cost}}{\text{No.of hours worked.}}$$

Maintenance cost includes machinery repairing and maintenance.

6) Return on Capital Employed Ratio :

There is only one ratio under primary ratio. This ratio is called profit to capital employed or return on

capital employed, or popularly, return on investment and is computed as --

$$\frac{\text{Profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Capital Employed}} = \frac{\text{Profit}}{\text{Capital Employed}}$$

Return on capital employed indicates the overall profitability of the operations of the business and the overall success of its management. Moreover, this ratio helps in evaluating and controlling capital expenditure projects and profit planning.

Capital Employed includes net fixed assets + net current assets.

a) Gross Profit to Sales Ratio :- The Gross profit ratio represents the gross margin. It expresses the relationship of gross profit on sales to net sales in terms of percentage. It is calculated by dividing the gross profit by sales.

$$\text{Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Net Sales}} \times 100$$

This ratio indicates the degree to which the selling price of goods per unit may decline without resulting in losses from operations to the firm. It also helps in ascertaining whether the average percentage of mark up on the goods is maintained.

b) Net Profit to Sales Ratio :- This measures the rate of net profit earned on sales. An increase in sales will make the

percentage of profit earned go up and is thus associated with efficiency. This net profit ratio is determined by dividing the net profit by sales.

$$\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Sales}} \times 100$$

A high net profit ratio would only mean adequate returns to the owners. This also enables a firm to withstand intense competition when the selling price is declining or cost of production is rising. A low net profit, on the other hand would only indicate inadequate returns to the owners.

c) Net Profit to Fixed Assets :- The profitability ratio is calculated in terms of the relationship between net profits and fixed assets. This ratio is calculated as follows :

$$\frac{\text{Net Profit}}{\text{Fixed Assets}} \times 100$$

This ratio indicates whether the fixed assets are being used properly. A reduction in the ratio shows either the assets are being kept idle or that trading conditions are bad.

d) Net Profit to Net Worth : This ratio indicates whether profitability is maintained.

$$\text{Net Profit to Net Worth Ratio} = \frac{\text{Net Profit}}{\text{Net Worth}} \times 100$$

Net Worth = Members Share Capital + Share amount + Non-refundable deposits + Own funds and deposits - Accumulated losses.

e) Stock Turnover Ratio :- The ratio indicates whether investment in inventory is efficiently used or not. It, therefore, explains whether investment in inventories is within proper limits or not. The ratio is calculated as follows :

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of Goods sold}}{\text{Average Inventory}}$$

Stock turnover ratio helps in determining the liquidity of a business concern as much as it indicates the rate at which the inventories are converted into sales and then into cash, ultimately. This ratio also throws light on the inventory policy persued by any unit and the reasonable of the same.

$$\text{Average Inventory} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

7) Other productivity :-

There are numerous ratios expressing each element of cost as percentage of sales and thus bringing each year's cost or expenses under common and comparable basis. These ratios shows the effectiveness of each element.

a) Cost of Sales to Sales Ratio :- This ratio is calculated by following formula :

Cost of Goods Sold = Opening Stock + Production - Closing Stock

$$\text{Cost of Sales to Sales Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Sales}}$$

This ratio is very important for analysing the profitability. A low expenses ratio is always welcome from the business standpoint, a high expenses ratio would only mean that a small percentage of sales is available for meeting all fixed expenses.

8) Total Productivity :

The formula of productivity measurement have to serve different types of purposes. The application of a particular formulae depends upon the availability of data. Some of these formulae are as follows :

i) Productivity formula based on Economic Unit :

$$\frac{\text{Value of Output}}{\text{Value of Input}}$$

ii) Productivity formula based on Physical Output :

$$\frac{q^1}{m^1} \Big/ \frac{q^o}{m^o}$$

q = Quantity or units of output produced.

m = Number of man hours worked.

Where, suffixes ^{o} and ^{1} denote the base year and the current year respectively.

iii) Productivity formula based on the price method.

$$\frac{\text{I Volume of Products}}{\text{I Volume of Factors}}$$

or

$$\frac{\text{I Price of Factors}}{\text{I Price of Products}}$$

This is common formula on which the price method is based.

iv) Productivity formula based on the Real Price Method :

$$\frac{\text{Quantity of Product}}{\text{Number of Working Hours.}}$$