Total Productivity=P(Say)= $\frac{G}{C}$ ……..(1)

From the definition of profit, we have;

Profit= π = G-C ……(2)

By dividing eq^{n} (2) by C, $\frac{\pi}{C} = \frac{G}{C} - 1$

So from (1), $\Rightarrow \frac{\pi}{C}$ =P-1

For Zero profit (π =0), $P = 1$

For a Loss, ($\pi \langle$ 0), $P \langle 1$

For a profit, $\pi \rangle 0, P \rangle 1$

Zero profit will give a productivity value of 1, while a loss will give productivity value less than 1.The profit to cost ratio will determine the increase in productivity.

The above relationship that demonstrates that increased profit to cost ratio will lead to increased overall productivity, is constituent with our expectation on how an overall performance measure should behave. However it suffers from a number of drawbacks. Some of which are listed here,

a) Given that our objective in productivity measurement is to capture the efficiency of utilization of resources, the effect of price variations over time need to be corrected. Thus aggregate output should be equal to gross sales suitably inflated or deflated with respect to a base year.
b) Equating output to sales implies, whatever is produced in the particular period is sold. Possibility of inventory, material manufactured for own use, etc. are n't taken in to consideration.
c) Equating aggregate input to cost raises a host of problems and involves several restrictive assumptions. How to account for the fixed investment and working capital, whether to take the fringe benefits in to account etc. are some of the problems.

The different approaches to measurement have arisen mainly in the context of correcting the above drawbacks.

1.6 Techniques for Productivity Improvement:

Higher productivity in organization leads to national prosperity and better standard of living for the whole community. The methods contribute to the improvement of productivity are method study and work measurement by reducing work content and Ineffective time.

Work content means the amount of work "contained in" a given product or process measured in man-hour or machine-hour. Except in some cases like in processing industries, actual operation times are far in excess of the theoretical minimum.

Ineffective time is the time for which the worker or machine or both are idle due to the shortcomings of the management or the worker.

CHAPTER-II
PRODUCTION SYSTEM

2.1 Introduction

A "Production System" is a system whose function is to transform an input into a desired output by means of a process (the production process) and of resources. The definition of a production system is thus based on four main elements: the input, the resources, the production process and the output.

Resources
Input-Production Process-Output

Most of the organizations (including non-profit organization) can be described as production systems.These organizations transform (or convert) a set of inputs (such as materials, labour, equipment, energy etc.) in to one or useful outputs. The outputs of a production system are normally called products. These products may be:

(a)Tangible goods (Steels,chemicals etc.) (b)Intangible services (Teaching,health care etc.) (c)combination of (a) and (b) (fast food,tailoring etc.)

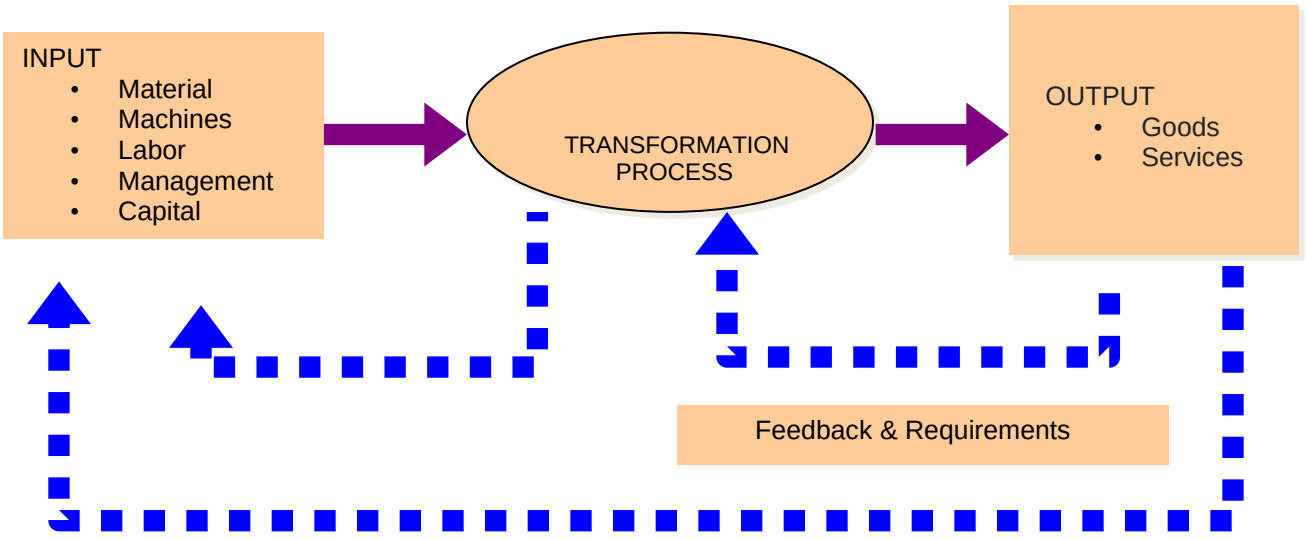

Fig 2.1 A simple block diagram of a production system

Production system refers to manufacturing subsystem that includes all functions required to design, produce, distribute and service a manufactured product. So this system produces goods and/or services on a continuous and/or batch basis with or without profit as a primary objective.

Production is the basic activity of all organizations and all other activities revolve around production activity. The output of production is the creation of goods and services which satisfy the needs of the customers. In some organization the product is physical (tangible) good. For example, refrigerators, motor cars, television, toothpaste etc., while in others it is a service (insurance, healthcare etc.).The production system has the following characteristics:

- Production is an organized activity, so every production system has an objective.
- The system transforms the various inputs (men, material, machines,information,energy) to useful outputs (goods and/or services).
- Production system doesn't oppose in isolation from the other organization system such as marketing, finance etc.
- There exists a feedback about the activities which is essential to control and improve system performance.

  The transformation process involves many activities and operation necessary to change inputs to output. These operations and activities can be mechanical, chemical, inspection and control, material handling operation etc.

2.2 Models of Production system:

A model is a representation of reality that captures the essential features of an object/system/process. Three types of models are there such as physical, schematic and mathematical.

I. *Physical model:* Replica of a physical object with a change of scale.
a. For big/huge structure of physical object: small scale (Ex. solar system)
b. For microscopic objects: magnified scale(Ex. Atomic model)

II. *Schematic model:* These are 2-D models which represents

- Price fluctuations with year.
- Symbolic chart of activities in sequence for a job.
- Maps of routings
- Networks of timed events.

The pictorial aspects are useful for good demonstration purposes.

III. *Mathematical model:*

Formulas and equations have long being the servants of physical sciences. One can represent the important aspect of a system/problem in mathematical form using variables, parameters and functions. This is called mathematical model .by analyzing and manipulating the mathematical model, we can learn how the real system will behave under various conditions.