

# The productivity of conversion process economics essay



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“ Productivity is never an accident. It is always the result of a commitment to excellence, intelligent planning, and focused effort.” – Paul J. Meyer

## **INTRODUCTION**

Productivity is used to examine the way a business is doing in terms of its efficiency as well as its effectiveness . Actually efficiency indicates how a business is conserving its resources to yield a given output. On the other hand effectiveness indicates how a certain objective of business is achieved irrespective of the inputs needed to achieve it. Thus, the two terms are quite different.

Productivity on the other hand is a ratio of value of output and cost of input . In the ideal case it is always greater than one and is an indicator if the synergy created by the firm to amplify the Inputs to the production /operations system by intelligent harnessing of the input resources during the conversion process from inputs to outputs.. Efficiency of a system cannot be greater than one because of the losses in the system The aim of determining Productivity measures are : carried out to:

- 1 Monitor and Control the quality of business processes
- 2 Continuously improve processes
- 3 Assess performance of a business
- 4 Determine a business' ability to sustain in the long-run

## 2. 2 CONCEPT

### **Meaning of Productivity:**

Productivity indicates the ratio of what we produce (volume measure of output) and what we use (volume measure of input). It is often defined as:

Where ' Output' refers to the goods and services generated and Input refers to the cost of factors of production like men , machines , material, , methods , knowledge , technology etc. It should be pointed out that in present times knowledge is also regarded as an important resource input to a production/operations system. The only point to be remembered is that in the material based or the so called brick and mortar systems the contribution of knowledge is lesser than in case of Rand D type industries or Information Technology type industries.

### **Productivity of Conversion Process**

Effectiveness of productions management may be viewed as the efficiency with which inputs is converted into outputs. This conversion efficiency can be gauged by the ratio of the output to the input and is commonly known as productivity of the system. Fig 2. 1 illustrates the production / conversion process.

The higher the productivity of production system, more effective and efficient the production function is said to be. The management of a production system is essentially concerned with management of its productivity.

## **Finish Products**

## **Conversion Process**

## **Raw Materials**

Manufacturing / Assembly

Operations

## **Output**

## **Input**

Feed Back

### **Fig 2. 1 Production system as Input/output model**

#### **process**

Japanese regard elimination of waste which is undesirable output and/or defective output from the system, then the productivity of the system can be improved by eliminating/minimizing the waste occurring in the system. Some examples of waste generated in a system are:

:

#### **1 Waste in the form of men, material, and machines waiting in the queue because of poor scheduling of these resources**

2 Production of defective goods and services (e. g. components/parts not conforming to standards etc.)

3 Higher conversion costs (higher costs resulting from inefficient methods, poor quality of tools, bad condition of equipment, poorly trained workers etc)

).

4 Higher total throughput time (due to waiting time, hunting time, queuing time, buried waiting time etc.)

In an efficient production system, wastes of all kinds must be eliminated or at least minimized.

### **Importance of productivity see VBD for points**

Productivity is process of converting resource inputs into goods or services in an organization. by utilizing labor, skills, innovation, technology and organizational structure. The productivity is important for any organization because it helps-

to improve in real incomes and economic well-being.

to improve monetary policy (inflationary pressures)

to improve fiscal policy (financing of health, education, welfare)

Is a primary determinant of an organization's level of profitability and its ability to survive.

Partially determines people's standard of living within a particular country.

### **TYPES OF PRODUCTIVITY MEASURES**

“ A productivity measurement is the best yardstick for comparing management of different units within an enterprise, and for comparing managements of different enterprises.” By Drucker

Various measures for productivity are listed as follows and shown in Fig. 2. 2.

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Partial or Single Factor Productivity

Total Factor Productivity

Multi-Factor Productivity

## **Multi-Factor Productivity**

### **Partial or Single**

### **Factor Productivity**

**Labour**

**Capital**

**Labour**

**Capital**

**Material**

**Power**

**Productivity**

**Total Factor Productivity**

**Labour**

**Capital**

## **FIGURE 2. 2 Types of productivity measurements**

### **2. 4. 1 Partial or single factor productivity**

The benefits of calculating partial productivity measures are: Ease in obtaining relevant data and identification of a single input upon productivity.

Partial productivity is simple to understand and enables management to focus on the specific area which needs to be improved through management

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by exception due to identification of the areas where there is a scope for improvement. Another benefit of calculating Partial productivity measure is the ease provided by this measure to compare the performance of one firm with other firms in similar type of industry. It is useful to determine the value added per human resource such as number of engines manufactured per man per year. It effectively identifies the installation of improvements created by measures like TPM or TQM in a firm. However partial productivity does not help in assessing the overall performance of the business done by the firm.

## **2. 4. 2 Total factor productivity**

The total productivity is defined as below

The benefit of calculating total factor productivity is that it gives a somewhat realistic estimate of productivity by subtracting purchased goods and services from total output thereby giving a true estimate of the output. However, it has a drawback in not accounting for the technology and energy inputs in the denominator but only considers labour and capital inputs which is a pure economists approach. Thus, it is an oversimplified though easy to calculate measure. This shortcoming is overcome in other measure of Productivity taken up in the next section.

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## **2. 4. 3 Total productivity or Multi-factor productivity**

The total productivity or multi-factor productivity is given by the following formula

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Multi-factor productivity is a holistic measure and considers intermediate inputs of a business and measures technical change in an industry but suffers from the difficulty in obtaining all the inputs and difficulty in communicating inter-industry linkages and aggregation. The theory discussed above is illustrated through some simple illustrative examples

### **Deflators:**

Example 1. Calculate the productivity for an organization which generate an output of

1, 20, 000 per day and total input of 1, 10, 000.

### **Solution:**

Example 2. Calculate the machine productivity for the given data.

Month

Working Hours

No of Machines

Production Units

January

**2000**

**500**

**1, 25, 000**

February

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**2500**

**550**

**1, 50, 000**

March

**3000**

**600**

**1, 75, 000**

Solution: Machine productivity is calculated as,

Total machine hours = Working Hours/machine x No of Machines

Month

Working Hours (a)

No of Machines (b)

Total machine hours (c = a x b)

Production Units (d)

Productivity = d/c

January

2000

500

10, 00, 000

11, 25, 000

1. 13

February

2500

550

13, 75, 000

16, 50, 000

1. 20

March

3000

600

18, 00, 000

22, 75, 000

1. 26

Example 3. Calculate the labour productivity for the given data.

Month

Output units ( ` )

Direct wages

Indirect wages

January

1, 75, 000

80, 000

15, 000

February

2, 50, 000

80, 000

20, 000

March

3, 75, 000

1, 00, 000

30, 000

Solution: Labour productivity is calculate as,

Total Labour wages = Direct wages + Indirect wages

Month

Output ( ` )

A

Direct wages

B

Indirect wages

C

Total wages

$$D = B + C$$

$$\text{Productivity} = A/D$$

January

1, 75, 000

80, 000

15, 000

95, 000

1. 84

February

2, 50, 000

80, 000

20, 000

1, 00, 000

2. 50

March

3, 75, 000

1, 00, 000

30, 000

1, 30, 000

2. 88

Example 4. The data for output produced and inputs consumed for Vinayaka Pvt Ltd is given below.

Value of Output

` 50, 000

Labour

`18, 000

Material Input

` 12, 000

Capital Input

` 18, 000

Energy Input

` 6, 000

Other Expenses

` 3, 000

### **Calculate:**

Partial productivity / Labour, Material, Capital, Energy and Other Expenses  
productivity / Various productivity indices

Total factor productivity

Total productivity

### **Solution :**

Partial productivity / Labour, Material, Capital, Energy and Other Expenses  
productivity / Different productivity indices are as

Total factor productivity is

Total productivity is

Example 5. The productivity data of Arjuna Pvt Ltd for the first two quarters (Q) of the year is given below. Using Indian rupee (₹) measures of input and output,

- a. Compare the total profit and productivity achieved for the first two quarters.
- b. How does Q2 productivity compare with Q1 productivity?
- c. Use partial factor productivity to identify what might be done to improve productivity and profitability during Q3.

Arjuna Pvt Ltd Quarterly Productivity Data

**Sr No**

**Description**

**Quarter 1**

**Quarter 2**

a

No. of units sold

20, 000

17, 000

b

Selling price/ unit

₹40

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`42

c

Labor in hours

18,000

15,550

d

Labor cost /hr

`20

`20

e

Material usage (kg)

10,000

9,000

f

Material cost/kg

`30

`31



g

Other overheads

`40, 000

`36, 000

### **Solution:**

Comparisons of the total profit and total productivity for the first two quarters

### **Description**

### **Formulas**

### **Calculation for Quarter 1**

### **Quarter 2**

op

Output

a x b

20, 000 x 40 = 8, 00, 000

**7, 14, 000**

ip

Input

c x d + e x f + g

$$18,000 \times 20 + 10,000 \times 30 + 40,000 = 7,00,000$$

**6,26,000**

p

Profit

op - ip

$$8,00,000 - 7,00,000$$

**= 1,00,000**

**88,000**

pr

Productivity

op / ip

$$8,00,000 / 7,00,000 = 1.14$$

**= 1.14**

When productivity of Quarter 1 is compared with productivity of Quarter 2, profit reduces by 12,000

(1,00,000 - 88,000) but productivity remains the same.

c. Looking at partial factor productivity for labor and materials:

## Description

## Calculation

### Quarter 1

### Quarter 2

## Remark

Labor productivity

$op / c \times d$

$$8,00,000 / 18,000 \times 20 = 2.22$$

## 2.30

Increased

Material productivity

$op / e \times f$

$$8,00,000 / 10,000 \times 30 = 2.67$$

## 2.56

Decreased

Labor productivity appears to have increased whereas material productivity has decreased.

Example 6. The productivity data of Yashraj Pvt Ltd is as follows

Yashraj Pvt Ltd Productivity Data

**Sr No**

**Particulars**

**2009**

**2010**

1

Goods Produced price/ unit ( ` )

35, 000

30

40, 000

35

2

Other Income( ` )

Deflator for item 2

30, 000

1

35, 000

1. 14

3

Labor in hours

Labor ( `/hr)

9000

90

8000

100

4

Material usage (MT) Material ( `/MT)

20

2500

25

3000

5

Power (KWH)

Power ( `/KWH)

1800

4. 0

2000

5. 2

6

Other overheads

Deflator for item 2

32000

1

25000

1. 2

Estimate the productivity indices for labour, material, power and other overheads

Solution: As deflator is given we have to calculate for 2010, assuming 2009 as base period.

We know,

Total output for 2010 :

Input for 2010 :

Productivity indices for labour, material, power and other overheads are