

Productivity introduction and definition economics essay



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This chapter is the literature review of the project. In this phase, some of the theories and concepts of productivity that are mostly used are discussed.

The chapter starts with a description of the term productivity; the meaning of which has been discussed over two centuries. Then, similar concepts like efficiency, effectiveness, profitability and performance are briefed. In addition, the model showing the relationship between the terms which were discussed so far has been illustrated. The chapter ends with different ways we can measure productivity in a factory.

Productivity: Introduction and definition.

Productivity is a multidimensional term, the meaning of which varies depending on the situation within which it is being used. (Bjorkman, 1991) Here, we will bring productivity into play in the manufacturing firm and the simplest definition could be an output to input ratio.

Productivity = Output

Input

According to Bernolak (1997), “ Productivity means how much and how well we produce from the resources used. If we produce more or better goods from the same resources, we increase productivity. Or if we produce the same goods from lesser resources, we also increase productivity. By “ resources”, we mean all human physical resources, that is, the people who produce the goods or provide the services, and the assets with which the people can produce the goods or provide the services. The resources that people use include the land, and buildings, fixed and moving machines and equipment, tools, raw materials, inventories and other current assets”

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Evolution of productivity.

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

Since competition has become fierce between companies, coming to an end to it is almost not feasible. A competitive strategic environment creates room for improvement for the survival of an organisation. Nonetheless, many researchers have argued that productivity is one of the most vital aspects for a company to achieve cost and quality advantages over their competitors. Since then, productivity has become a subject which is being discussed over years by industrialists, economists, management, media and so on.

Contradiction between verbal and mathematical definition

The verbal definition of productivity explains the idea of what productivity is. In other words, the concept of productivity is useful since it creates a model, a mutual view of what an organisation is trying to achieve. It can also be helpful while taking the organization's strategic decisions. (Bjorkman, 1991)

On the other hand, the mathematical definitions can be used as the basis of performance measures, where the major aim is to improve (not to explain) productivity.

2. 4 Productivity and waste

As per the various definitions of productivity by different authors, it can be concluded that productivity is related to value adding activities in a manufacturing firm. Activities performed which do not have an effect on the final products are therefore known as waste. In order to achieve high level of

productivity, wastes must be eliminated. Diagram 1 below shows the value adding and waste process.

Transformation process

Figure 1 shows the value added and waste process

2. 5 Key factors influencing productivity

Productivity is mainly concerned with the output (the number of products that are produced) and the input (the resources, for example labor, energy, capital and material that are being consumed) in the production activities. In addition, Hayes and Clerk (1995) state that factors like WIP (Work In Progress), waste and uncertainty should also be considered while studying the productivity of a factory.

In order to assess productivity level in a factory, it is essential to understand the key factors which are the most important to the manufacturing company's productivity. Grunberg (2004) identified some of the parameters which affect productivity and these are summarized in diagram 2 below.

Control (Purchasing, overproduction, total quality, location, finance, administration, planning, cost and articles)

Resources (Organisation, efficiency, work methods, motivations, new technology, losses and downtime, scheduling, absenteeism

Processes (Lead times, bottlenecks, wastes, cycle times, material flow, volumes)

Products (Design for assembly, product variants, development)

Figure 2 showing Grunberg (2004) key factors of productivity

3. Profitability and Productivity

Bernolak (1997) suggests that productivity is output volume per input volume. In contrast to that, profitability can be defined as output quantity times output unit price per input quantity times unit costs. Then, Tangen (2002) added that increased in productivity does not necessarily lead to increased in profitability in the short term but the effect of increased productivity is more likely to be realized in terms of long term profitability. On the other words, this means that a factory can benefit long term profitability if there is an increase in productivity.

Stainer (1997) devised a diagram to show the relationship between profitability, productivity and price recovery.

Figure 3 showing the relationship between productivity, profit and price recovery

4. Performance and Productivity.

According to Thomas and Baron (1994), those who argue about productivity are actually referring broadly about performance. Tangen (p. 40, 2004) declared that performance is a term which covers both economic and operational aspects and it is related to speed, flexibility, delivery time or quality as illustrated in diagram 4. Therefore it can be concluded that performance contributes largely to the success or failure of a factory. The types of performance that a particular company strives to fulfill are specific.

Slack et al. (2001) figured out the picture of the factors which affect the performance operations in a factory. (see figure 4 below)

Figure 4 showing the performance objectives (Slack et al, 2001)

5. Productivity Measurement

5.1 Efficiency and Effectiveness

The terms efficiency and effectiveness are sometimes confusing.

Effectiveness can be simply defined as “ doing the right things” while efficiency means “ doing things right”. In the case of industries, efficiency is a measure of how an organization makes use of its resources to the maximum according to a given level of customer satisfaction. Effectiveness on the other hand implies the extent to which customer requirements are achieved.

Efficiency of an organization is often called its productivity and measured in units of output. It can be measured in 3 different ways namely:

Labor efficiency

Overall Equipment Efficiency (OEE)

Line Efficiency

Labor efficiency: It can be defined as the number of output per given time period

Labor efficiency = Actual units per given time period

Standard units per given time period

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Overall Equipment Efficiency (OEE): It can be defined as the ratio between the time spent on producing goods of approved quality to the scheduled time.

$OEE = \text{Availability} \times \text{Performance efficiency} \times \text{Quality rate}$

Line efficiency: It can be defined as the ability to complete a job in a given time period.

$\text{Average pieces per min} = \frac{\text{Number of pieces total}}{\text{Number of minutes of production}}$

Number of minutes of production

$\text{Line Efficiency} = \frac{\text{Average pieces per min}}{\text{Actual piece per min}}$

Actual piece per min

5. 2 Partial and Multifactor Productivity

In general, productivity measures can be divided into 2 parts:

Partial Productivity.

Multifactor Productivity.

Partial Productivity: It is concerned with the relationship between single production factor (input) and its production result (output). It focuses on productivity measures for smaller areas, functions or sub-sections of the company.

Multifactor Productivity: Also known as the total factor productivity indicates the ratio of output relative to its input factors. It allows productivity

measures of upper levels in the company. It does not focus the same as that of partial productivity. On one hand, partial productivity will focus on the small sections only while multifactor productivity will deal with almost the whole company. That is why, both of them are vital for the organization.

Multifactor productivity can be measured as follows:

Total factor productivity = Output

Labor + Capital + Energy + Material + Miscellaneous

6. The triple P-model

According to Tangen (2002, p. 62), the triple-P model is a model which shows that performance, productivity and profitability can all be expressed as ratios of output and input. Efficiency is focused on the input side whereas effectiveness is on the output side. Diagram 5 below shows the relations of the terms productivity, profitability, effectiveness and efficiency.

Figure 5 showing relationship between performance, profitability, productivity, effectiveness and efficiency (Tangen, 2002)