The Need to Measure Productivity and the Problems Involved

Productivity is much easier to discuss than it is to measure. The need for sound measurement is almost as important as the improvement of productivity itself because it would be impossible to know whether productivity had improved or not, without being able to monitor changes over time. The objective of measuring productivity is to improve and control it.

Why is so much emphasis laid on the improvement of productivity and what is productivity? Conceptually productivity involves the combination and more efficient utilisation by management of all production resources to ensure maximum output at minimum cost. Interesting features that emerge from this definition are:

- Management is responsible for the way in which resources are combined and utilised in production;
- The term “production resources” is used indicating that there is more than one resource available to management and
- The phrase “maximum output at minimum cost” indicates that a close relationship exists between productivity and profitability.

Attempts at measuring productivity should take these three aspects into consideration. Attention is often focused on the measurement of labour productivity only. This is a very limited view, since productivity is a comprehensive concept and entails the effective use of all factors of production, of which labour is only one. The others are broadly, capital, energy and raw materials.

The correct measurement of productivity relates the quantity of goods and services produced to the quantity of resources consumed (man hours, machine hours, tons of cement, litres of fuel, etc). Output per unit of labour input (labour productivity) is influenced by many factors over which labour has no control, eg the quantity and sophistication of capital at its disposal.

The improvement of productivity has very little or nothing to do with working harder. Productivity increases when people are better trained, educated and motivated, have more efficient machinery and equipment to work with, have better working environments, develop new products and technology and are managed more effectively.

Numerous reasons support the notion that productivity improvement should be accorded the highest priority. Most of these are in one way or another related to the fact that productivity determines a nation’s standard of living. The economist, Milton Friedman observed that, in the long-term, nothing is more important for the economic prosperity of a country than a continual improvement in productivity.

Our standard of living — the goods and services (clothes, food, telephones, portable radios) available for us to enjoy, depends on the rate and cost (price) at which we can produce these goods and services. Simply put, the quantity of goods and services available to the average South African depends on the quantity of goods and services that the South African labour force produces.

It is difficult to convey the concept of productivity to the man in the street. He does not understand that the magnitude of his grocery bill, or the ever diminishing buying power of his retirement income, or the possibility that either he or his children might become unemployed depends to a very large extent on the improvement of productivity.

Employees must realise that productivity is not a word that appears only in public speeches made by politicians, or serves as a vehicle to enrich their capitalist employers even further, or is used by employers as an excuse for refusing higher wage demands. They must realise that their jobs and their pay cheques are at stake.

Productivity is a difficult concept, but it is central. Without productivity objectives, a business does not have direction. Without productivity measurements, it does not have concept.

The tendency to increase salaries and wages each year did very little towards increasing the standard of living of the average South African. It succeeded however in increasing the cost of living and contributed to the record levels of inflation experienced in this country during the 1980s. Salary and wage increases are not compensations for continuous increases in the cost of living. They must be seen as a minimum necessary to raise the standard of living. However, by demanding
match expected inflation rates, workers attempt to achieve real income protection, and with little increase in productivity, employers simply shift the entire increase in unit labour costs onto higher product prices. Actions like these lock wages and prices into an ever-rising spiral.

“The wage-price spiral can be broken through productivity increases. Higher productivity would permit wage increases that would not have to be matched by equal price increases, resulting in real wage gains combined with gradually reduced rates of increase in nominal wages and prices. If productivity gains exceed desired real wage gains, the wage-price spiral can gradually wind down and the core rate of inflation can be reduced.”

It is of the utmost importance that productivity awareness is created among all South Africans, irrespective of colour, age, sex or status, because it determines our standard of living, the competitiveness of our industries in international markets, our economic growth rate and our rate of inflation. Without proper attention to productivity it is hard to see how South Africa as an economic entity, or the individual firms of which it is comprised, will survive.

In order to control and improve productivity, it is desirable that industries and firms have unambiguous measures that will clearly indicate the relative contribution of productivity and prices of all the resources to the economic performance of the industry or firm. The NPI has developed a productivity measurement model, REALST (Resource Allocation Strategist) which is flexible enough to provide the answers to questions normally asked about productivity, including the answers required for wage negotiation purposes.

Business objectives are not usually couched in productivity terms, since productivity is rarely, if ever, the primary objective of the firm. Business objectives are commonly expressed in 'bottom line' financial terms, loosely referred to as profitability. Thus, businessmen need to be convinced that an improvement in productivity will result in bottom line benefits. A crucial requirement of productivity measurement must be an ability to give clear signals to management, for action to improve profitability.

The centre column of Figure 1 shows the relationship between profit, revenue and cost. Changes in profits can be driven by changes in revenue or cost which can move in the same or opposite directions. Changes in revenue are driven by changes in product quantities or product prices, while changes in cost are driven by changes in resource quantities and resource prices. In either case, movements can be in the same or opposite directions. It merely remains to make the vertical integration to derive the relationships that determine and drive changes in profits, viz productivity and price recovery.

Productivity is concerned with output in physical terms related to resources in physical terms. Price recovery measures the impact of changes in product prices in relation to changes in resource prices, the latter embracing all the inflationary pressure to which the organisation or industry is subjected, eg material and fuel prices, wage rates, electricity and rail tariffs and replacement costs of plant and equipment. In all cases, the effects can be measured directly as profit impacts for each resource employed.

To measure the utilisation benefits flowing from distributing non-variable costs over a larger production volume, it is necessary to categorise resources as either fixed, variable or semi-variable with respect to output. This is important because an increase in demand for the products or services of an industry will automatically improve the productivity of fixed resources such as plant and machinery. Such changes must be distinguished from productivity gains flowing from more resource employed.

“A stonemason living in the year 3 000 BC managed to chisel 10 lines per man day while his descendant, the scribe, reached 100 lines per man day in 1 000 AD. With the invention of the printing press in 1 500 AD, 1 000 lines per man day was possible and today the laser printer generates 10 million lines per man day. Labour productivity in this case, has increased a million times since early Biblical times, but not due to longer or harder work by the labourer; on the contrary, the stonemason certainly worked physically much harder than the operator of the laser printer. Productivity rose because of the technological developments incorporated in the substitution of another resource (capital). The operator of the laser printer certainly enjoys a higher standard of living than any of his predecessors in the printing industry. He has more and better clothes to wear, food to eat, transport facilities to use, better housing conditions and more leisure time because labour productivity increased dramatically since 3 000 BC.”
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- Productivity, which addresses the relationship between product volume and resource volume.
- Price recovery, which addresses the relationship between product price and resource price and
- Cost effectiveness, which addresses the relationship between product value (revenue) and resource value (cost).

By assigning resources to variable and non-variable categories, the productivity variance can be further broken down into:

- Capacity utilisation contribution which shows how much of the productivity change is a function of volume.
- Efficiency contribution which shows how much of the productivity change is a function of resource allocation decisions.

The model not only addresses the problem of labour productivity but also includes the productivity, price recovery and cost effectiveness contributions of materials, services, capital, energy and other resources in the manufacturing process. To be able to measure these influences is of the utmost importance for a manufacturer as these measurements determine the manner and the degree by which the costs of all resources are recovered from revenue.

Every industrialist is confronted with the question of whether or by how much prices should be increased as a result of increases in the cost of materials, wages, electricity and railway tariffs, etc. It is tempting to respond to most increases by increasing product prices. This may preserve the status quo but it is only by a better use and allocation of resources, ie higher productivity that the organisation can improve its competitiveness and rate of growth.

The REALST model measures the efficiency of all resources employed; shows the impact of each resource's utilisation on profitability and also illustrates the effects of management decisions on productivity and hence on the 'bottom line'.

Fundamentally speaking, labour productivity is the basis of our standard of living. Since, in toto, we cannot have more than we produce, labour productivity is a fundamental factor in the quality of human existence: no social or private advance can come from any other source than gains in output per person.  

Although this model is more easily applicable at the level of the firm, it can also be applied at the macro (sector or industry) level. Unfortunately macro data often does not exist in all the detail required for REALST and therefore macro productivity measures usually concentrate on partial and multi-factor productivity indices (MIPI). Partial indices relate output to a single resource — output per unit labour (labour productivity) or output per unit capital (capital productivity) — whilst multi-factor productivity include several types of input, eg labour and capital.

**FOOTNOTES**