

# CONSIDERATIONS REGARDING DIFFERENT APPROACHES TO MEASURING LABOR PRODUCTIVITY

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*Assessing the productivity of factors of production has been a key issue for economists for many decades, as the development and well-being of a government sector, industry or company have been very early on linked to the way in which inputs are used in order to produce outputs. In this respect, the main aim is to use the available (and often scarce) resources (human, material, capital, information etc) in the most efficient and effective manner as to generate the most output; in other words, to optimize the use of resources in order to produce the desired results.*

**Key words:** input, output, factors of production, productivity

## 1. THE ISSUE OF PRODUCTIVITY

Assessing the productivity of factors of production has been a key issue for economists for many decades, as the development and well-being of a government sector, industry or company have been very early on linked to the way in which inputs are used in order to produce outputs. In this respect, the main aim is to use the available (and often scarce) resources (human, material, capital, information etc) in the most efficient and effective manner as to generate the most output; in other words, to optimize the use of resources in order to produce the desired results.

There is no consensus regarding the definition of productivity, as the meaning varies depending on the purpose and area of specialization. A very broad definition of the productivity presents the concept as „the relation of output to input in

the manufacturing transformation process”. [1]

Other authors provide a more detailed definition of productivity, based on three main categories:

- The technological concept: the relationship between ratios of output to the inputs used in its production.
- The engineering concept: the relationship between the actual and the potential output of a process.
- The economist concept: the efficiency of resource allocation. [2]

The most commonly used approach of defining productivity is the cost-based assessment, based on the production function, equating production with productivity. This approach links the inputs to outputs and is aimed at identifying the maximum possible output that can be produced for a given amount of input or the minimum inputs to be used to achieve a given output. While this approach has the benefit of being of providing an easier way

of calculating productivity, it has the drawback of providing a too general picture.

Another method used for assessing productivity, known under the name of partial productivity, tries to offer a more detailed view of how a specific input factor contributes to the formation of the total output and may help in making decisions as to the best mix of production factors (such as using more performant equipment instead of human labor). One of the advantages of using partial productivity is that it allows the measurement over time of the evolution of the relationship between inputs and outputs. One of the drawbacks of this method is that by relating output to a single input, it sometimes oversimplifies the reality and does not consider the complex relationships and tradeoffs between inputs and how they contribute as a whole to the creation of the output.

Partial productivity is mostly used in the form of single-factor productivity, referring to the measurement of productivity presented as a ratio of output and one input. At frequent factors of production (labour, material, capital), they can be used to evaluate partial productivity by measuring indicators such as:

- indicators measuring the contribution of labor to the output (labor productivity):
  - output per man-hour worked
  - output per person employed
  - revenue per person employed
  - no flying hours per pilot per year or month
  - no. hours in class per professor
- indicators measuring the contribution of material resources to the output (material productivity):
  - output per value of materials used

- indicators measuring the contribution of capital resources to the output (capital productivity):

- output per fixed capital expenses
- output per working capital expenses.

Another way of measuring productivity tries to overcome the narrowness of the single-factor approach by relating the total outputs to the total inputs (all the factors of production used – labor, material, capital, energy, information etc).

An extension of this approach tries to take into consideration not only the tangible inputs, but also the intangible factors that influence productivity, variable(s) which account for effects in total output not caused directly by inputs. This approach, named *total factor productivity* refers to the portion of output not explained by the amount of inputs used in production. As such, its level is determined by how efficiently and intensely the inputs are utilized in production. [3]

For example, a winter with heavy snows and blizzards may generate higher costs (and lower incomes) for an airport than a milder weather year. This is an influence variable over the output, but it is not directly related to the inputs.

The above approaches to determining productivity are by no means exhaustive and there is no “ideal” way of determining the efficiency and effectiveness in using inputs to generate outputs. The optimum method has to be chosen depending on the context and purpose, and usually a combination of approaches is desirable to get an

accurate picture of the productivity and the strength and weaknesses of an organization.

## 2. DETERMINING LABOUR PRODUCTIVITY

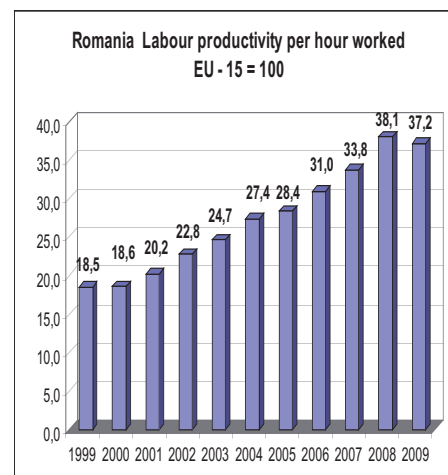
As with the overall concept of productivity, labor productivity is a relatively simple concept which is so easily defined. The most common definitions of labor productivity refer to the amount of goods and services produced by one hour of labor. Thus it is described as the rate of output per worker (or a group of workers) per unit of time as compared with an established standard or expected rate of output.[4] Labor productivity does not refer only to a company, it may also be used as a measure of the economic growth of a country, by assessing the amount of real GDP produced by an hour of labor (GDP per person employed).

These indicators are useful for generating a picture of how much labor contributes to the overall output, but as with other measures of productivity, managers are faced with many challenges in the interpretation of results deriving from calculations of productivity and in the attempt to include in these calculations both quantitative and qualitative factors. This is a challenge both at the level of an economy and at the level of an organization.

For instance, the indicator GDP per person employed expresses the overall labour productivity of a country and enables cross-country comparisons. As the GDP is calculated at market prices, as the monetary value of the final output of the activity of resident individuals and business, it incorporates all

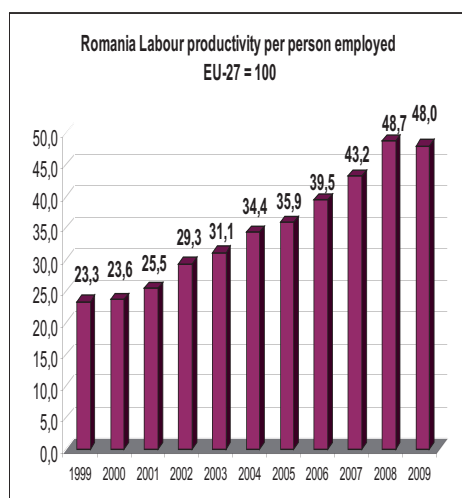
the advantages and the drawbacks of calculating the GDP. The Gross Domestic Product also incorporates market inefficiencies, speculative price increases (such as a real estate boom) and other variables, as a result it is sometimes difficult to estimate how much of the productivity increase is real and how much is just an illusion, generated by a speculative bubble.

Also, the widely used labor productivity indicator measured as the total output divided by the number of man hours worked often offers the picture of an increasing trend of the labor productivity.



**Fig. 1** Romania labor productivity per hour worked  
Source: EUROSTAT

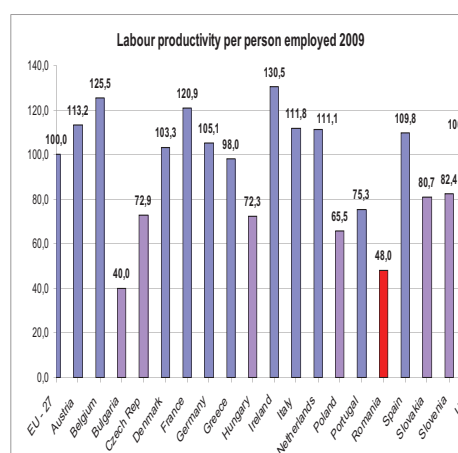
This type of indicator may be useful at the level of the economy in presenting the total output (GDP) correlated with the number of hours worked, or it may be illustrative in areas of activity where the output can be easily quantified, with the reserve that it remains a quantitative indicator and does not capture the qualitative aspects of the production.



**Fig. 2** Romania labor productivity per person employed  
*Source: EUROSTAT*

The increasing trend of the Romania's labor productivity per hour worked is generally regarded as a good sign, as good labor productivity is a desirable factor in any economy, but this indicator alone does not present the entire picture. An increase in employment, coupled with an increase in labor productivity is usually a sign of a growing economy, but in a recession it may happen that the labor productivity increases for a different reason – the companies can afford to hire fewer workers and demand more hours worked or to fire workers and demand the same output as before from the remaining workers.

As seen in **Figure 3**, in comparison with other countries from the EU area, Romania still experiences room for improvement in the labor productivity at national level, despite the encouraging increasing trend of the latter years. In 2009 the work productivity per person employed has been less than half the European average.



**Fig. 3** Romania labor productivity per person employed 2009  
*Source: EUROSTAT*

In the areas of education, health care, defense – generally speaking in the service sector, this indicator can be useful, but it generates the need for refinement and discussion in order to capture all the specifics of a particular area of activity.

The first difficulty in calculating the productivity per hour worked consists in quantifying the output of their activity. It is relatively easy to quantify the output of a worker (ex. number of bullets produced/ unit of time/worker), but the output for „white collar” activities is less obvious. Should we measure the productivity of the work of a pilot solely in the number of flying hours/ unit of time? Although tempting due to the ease of obtaining the necessary information (flight records), this indicator may prove to be misleading in many circumstances. The number of maximum flying hours/ unit of time is strictly regulated, but below this maximum level there are no clear correlations between a pilot's work quality and the number of flying hours. The question of increasing work productivity is a challenge for any manager, but in the particular

case of this example, what does an increase in labour productivity mean?

The various approaches for this problem have been classified in several categories [5]:

- the managed growth approach, meaning that the output increases faster than input
- the working smarter approach, referring to obtaining more output from the same input)
- more output with a reduction in input (considered as „the ideal” approach, but as with any ideals, this is the least likely to be achieved in the real world).
- greater efficiency approach, meaning that the aim is to obtain the same output with fewer inputs
- managed decline, meaning accepting an output decrease, correlated with a greater decrease in input.

In this particular example, one approach of increasing the work productivity may be to increasing the number of flying hours/pilot/unit of time up to the maximum limit admitted by regulations – increasing the output for the same input.

Apparently this measure would lead to a better productivity, but the approach ignores the potential problems deriving from pilots working longer hours – from lower motivation to small, correctible mistakes up to mistakes leading to major financial and human losses caused by lack of attention, fatigue etc.

Should we replace the no with flying hours with the number of passengers carried as the output for the pilot’s activity? Since the number of passengers carried in one flight (together with the size of the plane) is not a result of the pilot’s decision or performance, this is not a good indicator of pilot’s productivity. It would be irrational to consider

that the pilot of a Lear Jet is less productive than the pilot of a 747 for the reason that the number of passengers is different.

Another approach to increasing the productivity of the pilot’s work may be emphasizing the use of revenues/pilot employed as productivity indicator. This means either maintaining the same revenues but reducing the inputs (reducing the number of pilots, which in turn may lead to an increased workload for the remaining staff) or maintaining the same level of inputs, but increasing the level of revenues.

In this second case, we need to take a closer look at how the revenues are determined, as the indicator may be in some cases misleading. A decrease in the public confidence regarding travel, increased terrorist threats, declining economy etc may be external factors of influence with negative effects on the level of revenues, with no connection to the way pilots are performing their job. Using this data in calculating the labor productivity may provide the erroneous impression that the level of pilot productivity has decreased and that, in other words, they are not doing their job properly. In this case, we need to be extremely precise and selective in defining what „revenues” mean in this context, in order to identify the real problem causing the decline in productivity. Should we consider the revenues in general (turnover) or calculate productivity using the profit? Ideally, we should use for our calculations the revenues directly connected to the pilot’s activity, but this is very difficult, if nearly impossible to determine in reality. The passengers pay a fare for the air-transport service as a whole, meaning a vast array of services besides the flight itself and



deciding how to allocate both costs and revenues on various activities and tasks has long been a challenge for both accountants and managers.

As a result, maximizing labour productivity calculated as revenues/pilot employed is often accompanied by the attempt to decrease the costs, including personnel costs, through methods such as decreased wages, diminished benefits, paying the pilots depending on the number of flying hours instead of a fixed salary etc.

These measures have to be taken after a careful analysis and evaluation of their impact on the productivity, as extreme costs cuts may prove to have an undesirable negative effect over the labor productivity – lack of motivation, leading to a decrease in work performance.

### 3. CONCLUSIONS

Finding the most appropriate ways of increasing productivity in an organization is a challenge for any manager. This is especially true in the field of labour productivity and in the service sector, where an accurate and clear identification of the output in quantitative terms is more difficult than in the production sector.

In this sense, each organization must start by clearly defining the requirements of each activity, the role of the employees in the functioning of the activity and the components of each employee/activity output.

In quantifying the labour productivity, a crucial step is trying to determine the output directly related and influenced by the employee's work, as opposite to the output influenced by external factors, non-quantifiable or irrelevant variables.

This output should also be quantifiable and relevant to the purpose it is used for, namely measuring productivity.

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