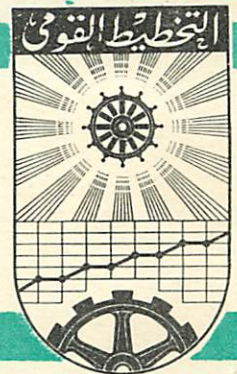


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## PRODUCTIVITY IN THE U.A.R.

One of the main objectives of our society is raising the standard of living of the individuals through increasing the national product. This may be effected in two ways, raising the production capacity of the nation, or improving the utilization of existing capacities. Any addition to the production capacity may take place only through additional investment, and this is outside the scope of this topic. Our main interest is in increasing production through improving productivity, a course of action which in many cases yields great returns with very little additional expenditure. It was for this reason that productivity has become a great concern for many people on different levels, the planners of the economy, the executors of the plan, also managers, farmers, engineers and many others. Nevertheless, a good deal of the talk on productivity reveals a hazy understanding of its concepts which leads in many cases to erroneous conclusions and decisions. We will therefore start by examining closely the meaning, significance, and measures of productivity.

Productivity means the efficiency of production, and here we define production in a very general sense, including industrial and agricultural production, utilities, services and distribution. Efficiency is generally a relationship between output and input. When we speak about the efficiency of an electric motor, we mean the ratio of its output of mechanical power to its input of electric power, measured usually in physical units. This is a simple measure of efficiency because there is only one type of input, and one type of output. The problem, however, is different in production, where inputs take various forms of different natures. We cannot avoid the issue by concentrating on output only because this may give an erroneous impression. One may increase output through a disproportionate increase in input.



Inputs to production can be classified into three main categories: capital, material and labor. If we want to divide the total output by the total input to get an overall productivity ratio, we have to transform inputs to a common scale in order to make them additive. This common scale may be the money value of each, which is the product of multiplication of the quantity of each input by its unit price. The productivity index in this case will be the money value of output divided by the money value of total input. This type of productivity measure is called economic productivity, as distinguished from physical productivity in which the inputs and outputs are expressed in quantities, such as manhours of labor, tons of coke, hours of a certain press, or number of bicycles produced. Physical productivity measures can only be applied on a single factor of input. The measure will be, for example, output per man-hour or output per machine-hour. This can be done for scarce or critical input factors. In our country skilled labor and capital in the form of equipment are critical and scarce factors both on the national and on the firm levels. We can also use an economic productivity index for a single factor by taking its money value as the input.

Outputs may also be measured in physical quantities or in money value. The value measure has the advantage of including quality in addition to quantity.

What has just been mentioned is a general exposition of some productivity measures. The use of any of these indexes may lead to erroneous conclusions unless the objectives of the whole operation are taken into consideration. The objectives depend on the level at which productivity is measured. The targets of an individual firm, for example, may or may not coincide with the targets of the national plan.

In order to show roughly how the use of the indexes is affected by the objectives, we take two simple goals as an example: one is to maximize profit with a lower bound on production, and the other to maximize production with a lower bound



on profit. In the former case we would like to have the ratio of output to total input as large as possible, as long as the volume or value of production is above the minimum requirements. Policies which result in the maximization of the total productivity ratio will then be emphasized. For example, special attention will be given to the economic use of manpower in order to maximize production per worker. On the other hand, the objective may be the maximization of production without putting any weight on profit other than keeping it above a certain minimum, possible zero, which means that any increase in production is welcome, as long as the value of the inputs required for it does not exceed the value of the additional output. The following numerical example may illustrate this point more clearly.

Suppose in a certain company an increase of LE.5,400 in the company's annual production may be gained through an addition to the labor force whose annual cost is LE.5,000. Suppose also that the normal gross profits of the company are 10% and that any operation which yields a profit less than 6% is immediately rejected. If the company's objective is to maximize profit the workers will not be hired, since the additional production will yield a profit of LE.400 annually with LE.5,000 tied in labor or 8%, which is less than the normal profit of the business. However, the decision will be quite different if production is to be maximized. As long as the expected profit from the new operation is larger than the minimum 6%, the increase in production of LE.400 is welcome.

Divergences may happen between an overall productivity figure and a specific productivity figure. The productivity of labor in the economically developed countries has risen tremendously since world war II, however the overall productivity increased at a much slower rate because the rise in the productivity of capital was slight. As a matter of fact, the greater productivity of labor took place though the use of more automatic



and consequently more expensive equipment. Divergences between overall and specific productivities take place when the quantities, qualities or prices of certain factors of production change in relation to other factors. Overall productivity may be used as a measure of the operating efficiency of the firm as a whole or of a certain line of production. It is at the same time a measure of the profitability of its operations. It takes into consideration, not only one factor of production, but all of them together, and not only their quantities, but their qualities as well. The main problems associated with its use are due to the price factor. Prices are very difficult to define and continually fluctuate with time. Changes in price may be due to: (1) changes in quality, (2) changes in the relationship between supply and demand, (3) price fixation by government, (4) economic cycles. Changes in price over time pose the following question: "Shall we use the current prices or the prices at a certain base year?" The answer depends on the use of the index. If it is used to compare the productivity in successive periods, then prices must be fixed at a certain base year. If the index is computed in order to choose, at any time, between products or processes, the prevailing prices at the time of the study should be used. There is also the difficulty of the definition of prices, and whether to use local or international prices. Again, the choice depends on the use.

The specific or single factor productivity has the advantage of concreteness, especially when it is measured by physical units. It is of great value when measuring homogenous inputs. Any increase in the output of a worker or a machine is reflected with the same proportion on the specific productivity index for this worker or that machine. It has however, the disadvantage of neglecting the changes in other inputs which are associated with the change in this input. Such indexes are thus particularly useful when comparing between the productivities of a single factor in different situations when the changes in other factors are negligible, or when this factor is a most critical one.



Many other problems arise in computing the inputs. For example, in calculating the labor factor in a firm, whether to take production manpower or both production and administrative manpower. The general tendency in recent years is the large rise in output per manhour of production workers in modern industrial firms. However, when administrative man hours are taken into consideration, the rise in output per man hour is much reduced. This is due to the large growth of administrative overhead in the modern firms. Again, there may be a choice between including direct and indirect production man hours. On the national level, another question arises: whether to include only the employed manpower or the total labor force. The latter alternative takes into consideration the problem of unemployment. There is also the problem of whether to add man hours directly or to weight each class of labor by its average earnings. Unweighted man hours are simple to compute but they consider one man hour of an expert technician just as important as one manhour of cheap labor. On the other hand, weighted man hours may be distorted by increases in wages due to upgrading or by changes in the wage structure. Another problem is the question of "Manhours worked versus man hours paid for". The difference is in paid vacations, holidays, sick leaves, ....., etc. Productivity per man hours paid for show slower rates of increase than productivity per manhours worked due to the increase in paid for nonworking time since world war II.

Capital, as an input factor, represents other problems. A decision must be taken as to whether to take fixed or both fixed and working capital, also whether it should be classified into local currency capital and foreign currency capital. Besides, the problem of depreciating the fixed capital does not have a universal solution.

Output may be measured in physical units or in value. The consideration of value is particularly important when raising productivity aims at improving quality as well as increasing



quantity. Price may be the scale for measuring quality and again the problems of estimating price come into the picture.

The appendix shows a classification of some methods of improving productivity. The list is by no means comprehensive and the course to be followed depends mainly on the situation, its scope, and its objectives.

This essay is not intended to cover the subject of productivity neither is it intended to solve specific problems in that field. It rather aims at stimulating thought on the subject, so that efforts may be spent on contemplating the means of improving that productivity which express the real objectives of our society.



APPENDIX

Summary of considerations in a Productivity Study

| Scope         | Objectives   | Productivity                                    | Use of Measures  | Methods of Improvement      |
|---------------|--|---|--|-----------------------------|
| <u>Nation</u> | Maximize national Product under  | Economic Productivity:                          | Comparison of Productivity   | 1. Technological            |
| <u>Sector</u> | Limitation of foreign currency, employment, etc..  | (a) Overall (b) Specific Physical Productivity: | from one period to another   | -product design             |
| <u>Firm</u>   |  | Specific Inputs:                                | Choice of Technologies   | -Machinery and equipment    |
|               |  | 1. Material Direct vs. Direct and indirect      | Choice of productivities of industries, firms, departments or workers. | -Layout planning            |
| Operation     | Maximize Production under limitations of capital expenditure, foreign currency, employment, profit, etc... | 2. Labor  | Better utilization of scarce resources                                 | -Waste elimination.         |
|               |  | a) Direct production                            |  | -Organization               |
|               |  | b) Direct & indirect production                 |  | -2. Economical              |
|               |  | c) Production & adm.                            |  | -Economy of size and volume |
|               |  | d) Total labor force                            |  | -Financial incentive        |
|               |  | e) Weighted vs. unweighted manhours.            |  | 3. Human:                   |
|               |  | f) Manhours worked vs. manhours paid for        |  | -Selection & training       |
|               |  | 3. Capital                                      |  | -Methods                    |
|               |  | a) Depreciation                                 |  | -Working conditions         |
|               |  | b) Fixed vs. fixed & working                    |  | -Safety                     |
|               |  | c) Local & foreign currencies                   |  | -Morale                     |
|               |  |   |  | -Welfare                    |
|               |  | <u>Output</u>                                   |  |                             |
|               |  | Quantity vs. quantity & quality                 |  |                             |
|               |  | Prices:   |  |                             |
|               |  | 1. Local vs. International                      |  |                             |
|               |  | 2. Base year vs. current                        |  |                             |



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