7. LABOUR PRODUCTIVITY IN PLANNING

7.1 - THE GENERAL CONCEPT OF PRODUCTIVITY OF LABOUR

In a sense, labour productivity is the general indicator of economic efficiency. It gives the final result that comes from absolute measures and steps in planning. Efficiency, however, must be clearly defined in terms of time. Because, finally, economy and its planning are a matter of time. A society or country which needs less time for producing all necessary goods than before or than any other economy will be the more advanced and economically more powerful one. The less time we have to use for producing all the necessary goods the more time available both for additional production and human activities in other fields (science, arts, health, etc.).

Thus we can define labour productivity as follows:

Volume of output produced by a worker in one unit of time or the inverse of this definition as time needed by one worker for producing one unit of output.

The time needed for one unit of production (or the number of units produced in one unit of time) are determined by four factors:

1. average skills and experiences of the worker and his attitude to work as well;
2. quality and quantity of means of production which the worker is operating;

3. level and degree of technological applicability of science; and

4. organization of production at all levels of economy.

The main factor, apparently, is the worker. He represents the ultimate productive force we have. It is essential, therefore, that all social, political, educational, technological, etc., conditions be created for giving full scope to his activity. There can be no doubt that already the establishment of a public sector may give the worker a feeling that he is not working any more for the mere benefit of the former private owner of the factory. This fact will give an impetus to work more, which is a direct factor of productivity.

Nowadays, utilities cannot be separated from the utilization of modern equipments. If, therefore, developing countries, like India, wish to have remarkable increase in productivity they should think and act in terms of labour and capital intensive-mixed industries and techniques.

Science seems to be widely acknowledged as a direct factor of economic development. Hence the remarkable efforts have been taken especially by the specialists countries for promotion of science. However, it is not merely a science as such which greatly helps ahead the national economy. It is rather its degree of technological applicability which
makes it function as a productive force. Any work in the field of science, therefore, should be geared to the main lines and targets of economic development. Yet, what and how much should be done and when, must be directly planned. Research is no longer activity of individuals with no strict link to the social and economic targets of the plan. Countries which do have all the necessary conditions for planning in its proper sense face the problem of planning the ever-growing share of scientific labour in total productive labour. This is the way to fully utilize this extremely important factor of labour productivity. This factor, however, has to be made operational on many lines; new technologies, modernization of equipments and last not least, better technological training of all manpower. [12]

Finally the mode of organization of production directly reduces the time required for a given volume of production. It is well known that generally specialized productive units are superior to universal ones. Since the advanced capitalist economies have developed in many cases, a fairly good system of infra-factory organization of production, all developing countries with a large public sector have the chance to set up, in addition, a highly productive national organization of production on a functional basis. This chance stems from, though partial, the elimination of private capitalistic influence on the national economy which, by its nature, gives preference to the factory’s interest. The general public
organization industries are a promising beginning in this field. They can be substantially 'productivity creating' if they manage to model a national organization of economic activities at the level, at least, of that industry for which they are responsible.

7.2 - **CALCULATION OF LABOUR PRODUCTIVITY**

7.2.1 : **THE TIME-SUMMING METHOD**

Although there exist several ways to calculate productivity according to the specific aims the planner has in mind all of them have to be related, primarily, to the result of productive labour (= production) and the time required for achieving this result. The following brief discussion deals with the so called "Time Summing Method".

The basic idea of this system is to calculate exactly the time needed for doing every partial operation in producing one product and the total time used for the product itself, and finally the time that had been spent for total production of a factory. This approach necessitates a technical plan which covers all measures in the field of technical and technological improvement and their impacts of the time consumption for producing the planned assortment of output. In otherwords, labour productivity (both in absolute terms and given as a growth rate) describes the final efficiency of technical and hence economic progress or, the other way around, the technical plan is the prerequisite of planning of productivity.
The mentioned time summing method is based on two simple formulae:

(i) \( \frac{eq_1 \cdot t_0}{eq_1 \cdot t_1} \)

(ii) \( \frac{eq_0 \cdot t_0}{eq_0 \cdot t_1} \)

where

- \( q_0 \) stands for quantity for production in base year
- \( q_1 \) stands for quantity for production in plan year
- \( t_0 \) stands for time needed for producing \( q_0 \)
- \( t_1 \) stands for time planned for producing \( q_1 \) in plan year.

Formula (i) tells us how much time we would need for the planned production \( (q_1) \) if the work standards (norms) were taken from the preceding year \( (t_0) \) as against the time planned for the new year \( (t_1) \). The result is the rate of growth in productivity.

In practical planning, however, we face repeated changes of the structure of production which remarkably affect the average productivity indicator. These shifts have to be eliminated. This is why we need formula (ii). Here the calculation is related only to the output of the base year \( (q_0) \) whilst a comparison is made between the definitely used time \( (t_0) \) and the planned time \( (t_1) \).

7.2.2: A SIMPLIFIED MODEL OF PRODUCTIVITY

Planning of productivity requires a differentiated study of its factor. These factors can be signed out by an appropriate
economic model which integrates all those magnitudes that are objectively related to productivity. The following model will be built of two time categories, two man-power categories and two products.

Suppose:

Actual working time \((t_0 \text{ and } t_1)\)
Nominal working time \((t_0^{\text{nom}} \text{ and } t_1^{\text{nom}})\)
Workers
All employed (including workers).

To carry on following assumptions can be made in base year of plan.

**PREVIOUS YEAR (0)**

<table>
<thead>
<tr>
<th>Product</th>
<th>(q_0)</th>
<th>(t_0)</th>
<th>(t_0^{\text{nom}})</th>
<th>(t_1)</th>
<th>(t_1^{\text{nom}})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product A</td>
<td>3</td>
<td>1</td>
<td>1.33</td>
<td>1.66</td>
<td>2.33</td>
</tr>
<tr>
<td>Product B</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>2.57</td>
<td>3.86</td>
</tr>
</tbody>
</table>

Having drafted the plan (production plan and technical plan) following figures can be calculated which are actually
the targets for the plan year.

**PLAN YEAR (1)**

<table>
<thead>
<tr>
<th></th>
<th>WORKERS</th>
<th></th>
<th>ALL EMPLOYED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$q_1$</td>
<td>$t_1$</td>
<td>$t_1^{nom}$</td>
<td>$t_1$</td>
</tr>
<tr>
<td>Product A</td>
<td>10</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Product B</td>
<td>10</td>
<td>2.0</td>
<td>2.5</td>
<td>2.2</td>
</tr>
</tbody>
</table>

One can see easily that which improvement and changes have been provided for in actual plan. Now the productivity indicator must be found. It is clear that different factors of productivity cannot be expressed by one coefficients. With the help of two mentioned formulae, one can have following productivity coefficients

<table>
<thead>
<tr>
<th></th>
<th>WORKERS</th>
<th></th>
<th>ALL EMPLOYED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Base Year</td>
<td>Plan Year</td>
<td>Base</td>
</tr>
<tr>
<td>Actual time</td>
<td>1.1</td>
<td>1.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nominal time</td>
<td>-</td>
<td>1.4</td>
<td>-</td>
<td>1.74</td>
</tr>
</tbody>
</table>
For implication some coefficients have been dropped. The calculation is carried as follows:

The first coefficient:

\[
\frac{\varepsilon q_1 \cdot t_0}{\varepsilon q_1 t_1} = \frac{3 \times 1 + 7 \times 2}{3.9 \times 5 + 7 \times 2} = \frac{17.0}{15.5} = 1.1
\]

The second coefficient:

\[
\frac{\varepsilon q_1 \cdot t_0}{\varepsilon q_1 t_1} = \frac{10 \times 1 + 10 \times 2}{10 \times 5 + 10 \times 2} = \frac{30}{25} = 1.2
\]

and so on.

7.2.3 : FACTOR ANALYSIS OF CONCLUSIONS IN 7.2.2

The subsequent analysis reveals to what extent each factor will really contribute to the increase in productivity of labour. The grand total in above model is 1.74, i.e., finally, productivity will grow by 74% during the plan period.

a) The first coefficient of 1.1 indicates about the contribution of technological improvements to the planned increase of productivity. This so, because it had been calculated on the basis of the output in the previous year (i.e., all changes of the assortment are actually eliminated) and the time
needed and planned \((t_0 \cdot t_1)\). The net element in this first calculation is the reduced time.

If it would have produced the same quantity \((q_0)\) as against the year before, productivity of labour would have risen by 10%. This increase, which is the inverse of the reduction of the actual working time, comes from technical progress.

b) The second coefficient \((1.2)\) expresses the expenditure of actual working time for the planned production \((q_1)\). In addition to the first, it includes the new structure of output. Here we have the results of the shift in the assortment of production. As the two tables show the output of product A rose from 3 units to 10 units with actual working time for each being produced from one unit to 0.5. Simultaneously, there was a less significant increase in production of product B (7 to 10) with no reduction of actual working time \((t_0 - t_1)\) per unit until now, total increase is 20% \((1.2)\). As technical progress accounts for 10%, structural improvement in output contributed another 10% to the growth of productivity.

c) So far both calculations covered the actual working time. The latter, however, as a rule, is less than the nominal working time. To lessen the difference between both time categories means to have more actual working time available which increases production without any increase in the number of workers and the actual time required for one unit of output. Better utilization of the nominal working time diminishes the waste of time which substantially contributes to productivity. The reasons for that is, usually, improvement in the organization and management of production.
Thus the third indicator (1.4) adds 20% to the productivity already gained from technical progress and better structure of output.

d) Finally, we have to take into account not only the workers but all manpower of factory. These include, in addition to the workers, the engineering, managerial (administrative) and auxiliary personnel. Apart from the engineering staff, the share of the other sub-categories of manpower should decrease to an extent which is minimal but just sufficient for running the plant efficiently. We may assume rightly, that most factories do have possibilities to reduce the number of their administrative staff thus economizing management. In our analysis the difference between 1.4 and 1.7 (total increase) marks the effect of improvement in the field under discussion. Actually the efforts against bureaucracy resulted in a contribution of 34% to the overall growth of labour productivity.

Summing up we find the following impacts of the various factors on productivity.

<table>
<thead>
<tr>
<th>Description</th>
<th>Share in Total Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Technical progress 10% (1.1)</td>
<td>13.5%</td>
</tr>
<tr>
<td>b) Structural changes 10% (1.2) of output</td>
<td>13.5%</td>
</tr>
<tr>
<td>c) Better utilization of 20% (1.4) nominal working time</td>
<td>27.0%</td>
</tr>
<tr>
<td>d) Better management 34% (1.74) and administration</td>
<td>46.0%</td>
</tr>
<tr>
<td>Increase of Productivity</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
The model simplified as it entails two important general rules for the planner. The first is that productivity per nominal working time should always grow faster than per actual working time (this is valid for all categories of manpower).

\[ \Delta \text{output per worker} > \Delta \text{output per worker} \]

(1 hour nominal working time) (1 hour actual working time)

If so, we have a smaller absolute difference between both time categories or less waste time. And time is productivity.

The second rule favours a more rapid increase of productivity per employed than per worker. The difference, if shrinking, again means less wastage of manpower in the field of administration and the like.

\[ \Delta \text{output per employed} > \Delta \text{output per worker} \]

Both rules seem to be very advantageous for industrial planning in developing economies. Because they provide for an increase in productivity, which is the main problem in development, without or almost without investment. Either factor is productivity, creating and simultaneously, investment-saving. However, it remains still true that the most significant factor of productivity is technical progress which is by no means investment-saving. However, no country can afford to neglect even, secondary factors in this vital field
of economic progress.

7.3 - **CONCLUDING REMARKS**

The time summing method can be used at enterprise or managerial level. It asks for a well-knit system of managerial planning, statistics, and management. The analytical work by factors will clearly point out the possibilities for further increase in productivity both weak and strong fields of the economic activities of the respective organization.

Thus, for the time being this model reflects mainly plan productivity within one industry, it will and can be used for inter-industries also. It is usually argued that such comparisons are unfair due to industries covered by such model have different environment from one to another. However, that must be investigated thoroughly and not eliminated in order to find out the best ways, i.e., the most productive ones.