

Introductory Note

Practically the world over, there has been increasing recognition that the development of supervisory skills can significantly contribute to the improvement of productivity of an enterprise. From its inception in 1958, the National Productivity Council has laid stress on supervisory development programmes, but since it needed a more concerted drive, it introduced during the Asian Productivity Year 1970, a nation-wide scheme to prepare candidates through self-study and classroom or enterprise-level guidance for a professional qualifying examination leading to the award of the National Informatics Center in Supervision.

The response to the NPC scheme has been quite good. Management of all forward-looking enterprises have evinced considerable interest, and a large number of candidates have appeared for the examination. In implementing the NPC's Supervisory Development Scheme, some of the Local Productivity Councils have extended their cooperation and support. The success of any self-study scheme ultimately depends on making available adequate study material prepared by competent experts, and written in a lucid and simple style. NPC has brought out many management Guides so far which attempt to give a basic understanding of the various topics included in the syllabus.

This Guide, on Productivity and Economic Growth has been prepared by shri M.V.V.Raman, formerly Regional Director, NPC, Bangalore.

These Guides are designed to be of help also to managerial personnel as well as students of Management who have some basic understanding of the science and practice of management.

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1. Productivity and Economic Growth

Economic Growth

A little reflection at the various activities going on in the community - farms, factories, hospitals, banks, offices, schools etc. - will reveal that people are engaged in the process of earning a living by producing goods and services required by the community. The inter-relationship of all these economic activities and their accumulation constitutes what may be called as an economic system, which should cater to the comforts and well-being of individuals in the community. The manipulation of the economic system for the well-being of the individuals in a community is a continuing process and constitutes the economic growth.

Economic growth in simple terms signifies material progress. It includes the provision of goods and services for the population; provision of adequate income and leisure to enjoy the goods and services produced; it also includes the provision of a continuous rise in the rate of growth to satisfy a given population in the above terms in a condition of national security and internal law and order.

A measure of economic growth as an indicator of prosperity would be useful. The cumulation of economic values produced in all sectors of the economy computed in terms of money provides a near-accurate measure of Gross National Product (GNP) and National Income of a country. One of the simple and basic measures of economic growth is derived from the national income analysis. In this analysis the gross national product is expressed in monetary terms. The influences of price fluctuations on the monetary figures for the national product are eliminated by expressing it in terms of base year prices or considering at constant prices. If this national product in monetary terms is divided by the total population, the national product per capita is obtained. Thus, the current per capita national product expressed in terms of the price level in a given base year, may be regarded as the level of prosperity achieved in the national economy; this is only to get a feeling of the level of prosperity attained. However, it is to be noted that growth in per capita Income need not necessarily show the overall standard of living of the population increasing as it does not take into account the distribution of the same.

The Asian Scene

A visualisation of the economic growth and consequently the material progress in the Asian countries may be obtained from a comparative view of per capita income of various countries. Based on a World Bank Survey, Figure 1 shows the per capita GNP in some of the Asian countries. Figure 2 shows the per capita GDP for several countries of the West as well as Asia.

Though direct comparisons of national income or per capita income of several countries will not be very meaningful, what that income can buy for an individual is of great significance and provides an indication of the extent of prosperity of the nation or the standard of living of the individual.

The above idea may be elaborated further. Prosperity in the context of productivity and economic growth relates to the economic well-being of a large section of the community. It signifies the availability of goods and services for the well being of a large section of population at prices it can afford. The quantum and quality of consumption of goods and services may be taken as an indicator of the standard of living of the people. In fact, this is the major goal of planning as has been stated in our Five Year Plans, namely, to raise the standard of living for the mass of the people. This, in turn, means the availability of adequate facilities for the production of these goods and services at prices people can afford. These items that seem to cover the most pertinent aspects of levels of living are: 1

- (i) food and nutrition,
- (ii) clothing,
- (iii) housing, including sanitation,
- (iv) health facilities,
- (v) educational facilities,
- (vi) information media,
- (vii) energy consumption,
- (viii) transportation.

For some of these components of consumption summary statistical evidence are presented in Table 1.

The production aspect of the basic infra-structure may also be indicated in (Table 2) which reveals higher values for countries which have higher economic growth and consequently higher levels of consumption as revealed in Table 1.

1. Asian Drama, Vol. 1, Gunnar Myrdal, p. 538, Penguin Books.

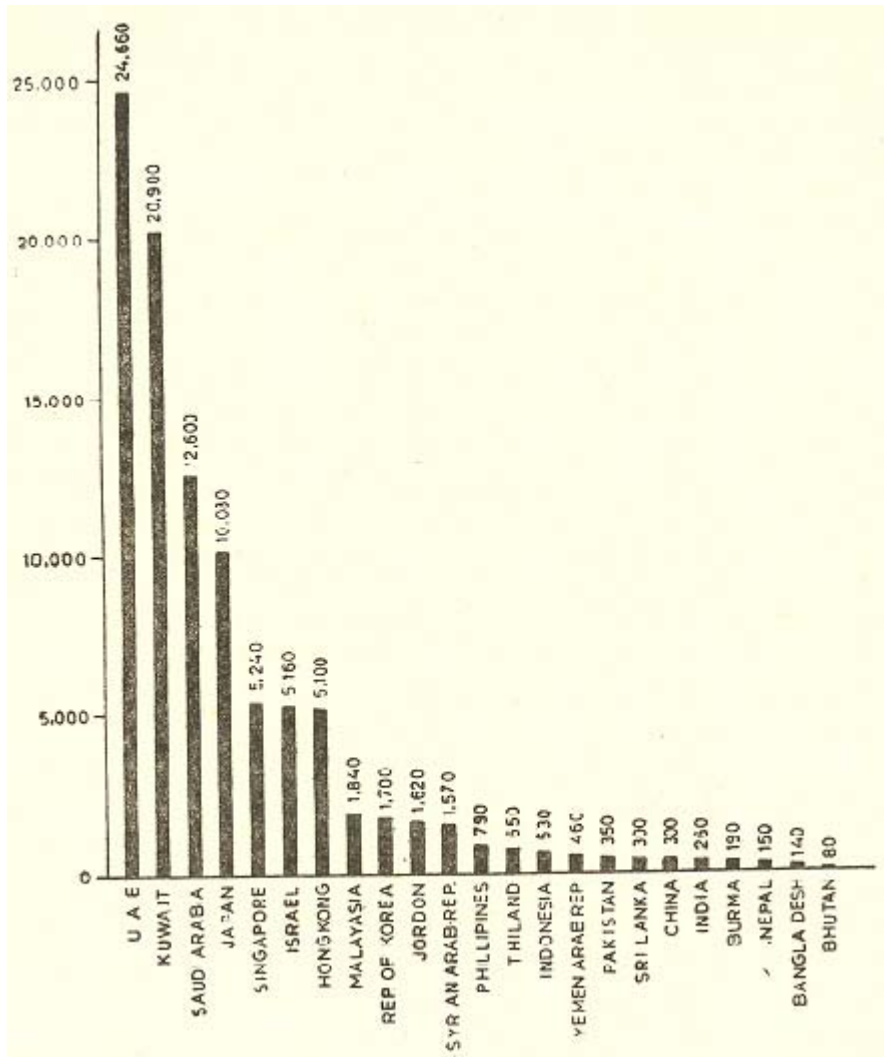


Fig. 1. Per Capita Gross National Product (GNP) Expressed in US Dollars-1981

Source: World Development Report, 1983 Issued by The World Bank

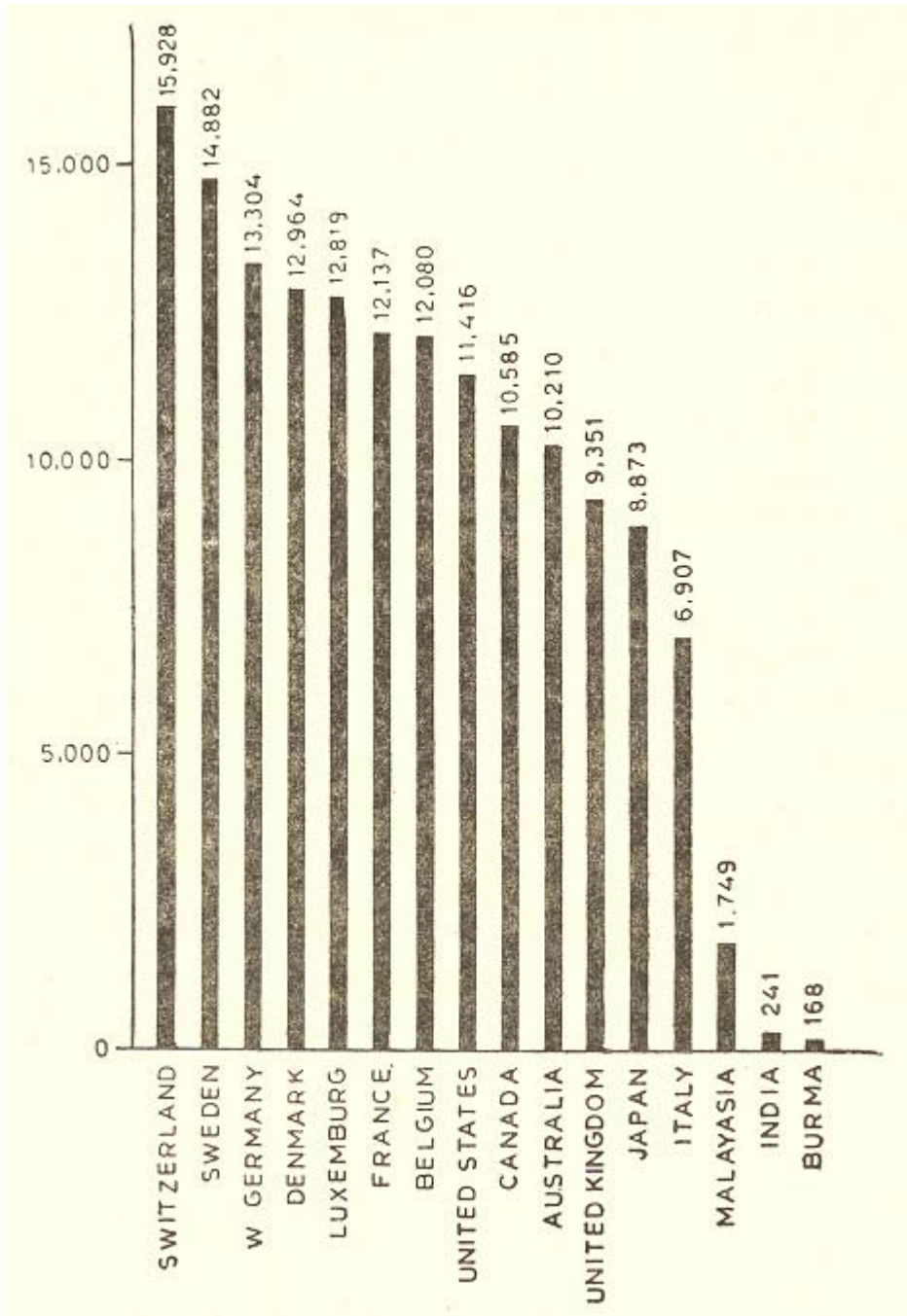


Fig. 2. Per Capita GDP Expressed in US Dollars-1980

Source: U.N. Yearbook of National Accounts Statistics (1981)

TABLE 1 : Consumption Figures

<i>Items</i>	<i>Year</i>	<i>India</i>	<i>UK</i>	<i>USA</i>
1 Food				
1.1 Calories per head per day	1970	1990	3170	3,300
1.2 Proteins per head per day (gms)	1970	49	87	99
2 Clothing				
2.1 Annual Textile Consumption (Kgs per head)	1956-58	2.4	11.7	15.5
2.2 Of which cotton (%)	1956-58	92	49	67
3 Health				
3.1 Population per bed (Nos.)	1977	1254	119	164
3.3 Population per physician (Nos.)	1978	3586	654	524
4 Culture				
4.1 Number of receivers of Radio broadcasting (per one thousand)	1979	34	931	2040
4.2 Number of receivers of Television broadcasting (per one thousand)	1979	1	394	635
4.3 Newsprint consumption (Kgs. per head)	1980	0.41	24.58	49.48
4.4 Tractors in use (per 10,000 persons)	1980	63.0	916.1	2097.4
5 Motor Vehicles (Per 10,000) Persons)				
5.1 Passenger cars (Nos.)	1980	13.9	2557.7	5203.4
Commercial vehicles (Nos.)	1980	12.2	321.4	1467.5
Fertilizer Consumption (Per head per year) (Kgs.)	1980	7.9	36.7	93.5

Source: Statistical year book of United Nations, 1981

TABLE 2: Per Capita Production of Selected Items

<i>Items</i>	<i>Years</i>	<i>India</i>	<i>UK</i>	<i>USA</i>
1. Crude Steel (Kgs.)	1983	14.1	283.5	322.7
2. Electric Energy (KWH)	1983	181.2	4902.2	10195.1
3. Cement (Kgs.)	1983	35.3	237.7	269.6
4. Aluminium (Kgs.)	1983	0.3	6.8	21.6
5. Copper (Kgs.)	1983	0.05	2.6	5.1
6. Sulphuric Acid (Kgs.)	1983	2.9	46.7	126.7

Source: Monthly Bulletin of Statistics, UN, July, 1984

Productivity

In order that we may produce a product or provide a service, we must have resources in the form of men, machines, materials, money. etc. In a broad sense, productivity means goods and services produced in relation to the resources utilised in producing the same. Productivity is thus implied in every economic activity and is defined as the ratio of output to input. This simply means that in order to produce a product or a service, either in the field, factories, offices or any other place of economic activity, certain resources would have to be employed in the form of inputs to obtain output, and productivity takes into consideration both these aspects simultaneously. Higher productivity can be regarded as efficient use of the inputs in terms of output, quality and costs.

Productivity is not production. Production merely means volume of output. Production can be increased without consideration of cost, by increasing the input of labour, material and equipment. Duplication of factory or additional shift increases production. But this may not increase productivity. Productivity is not merely volume of output, but output in relation to the resources employed. Productivity may increase without increase of production; productivity increases when lesser quantities of inputs are employed for the same output. If one hundred men in a factory turn out the same quantity of goods of the same quality over the same period as 130 men in another factory, equal in all respects, though the production is the same in both the factories, the productivity is not the same. The labour productivity in the factory employing only hundred men is obviously higher.

The next question is productivity of what? Productivity is sometimes expressed in terms of output per man or per man-hour. This has given rise to the misunder-

standing that productivity always means labour productivity. This misunderstanding gives rise to the impression that productivity would cause displacement or unemployment of labour. This is not necessarily true. Productivity can also be expressed as output per unit cost of materials, as output per unit of floor space, as output per machine or machine-hour, as output per unit capital or as output per unit energy consumed, etc. Thus, increased productivity does not necessarily mean reduction in labour employed, but implies efficient utilisation of the different factors of production.

It should emphasise that increases in the national product could be obtained by the use of increased input resources and also by increasing productivity. Higher productivity is not just increased production, which is merely producing more by using more resources. This method of producing more does not help in the process of economic development and growth, as well as for the conservation of resources. On the other hand, more efficient use of resources contributes to increase in productivity causing reduction in price per unit and help in holding the price level; increased opportunities of investment in newer industries and ventures; increases in purchasing power of money and wages of the workers; increased employment opportunities by starting new industries, consequent on increase in demand for goods and services, causing speedier economic growth and achievement of national objectives.

In this connection, the pessimistic prophecies of earlier economists may be pointed out. They had indicated that the limited natural resources would not be able to support the expanding population, with the result that chaos and misery would follow. Experience has shown that this was a wrong assessment of the possibilities of economic growth, and did not take into consideration the immense potentialities of productivity advances based on technological progress. Recent studies in economic growth and productivity have clearly shown that growth and consequent material progress have coincided with the advance in productivity.

Studies have shown that the growth rates achieved in advanced countries are not due to increase in capital and labour alone, but also due to increases in total productivity. But in developing countries the opposite appears to be true. This, however, does not mean that factor augmentation, particularly, substantial growth in capital investment is not important. What it suggests is that factor augmentation is not enough and that it has to be accompanied by or to embody substantial increases in productivity of inputs, if the growth is to be rapid and genuine development.²

2. Charles Wolf Jr., Top Management Symposium, APO, Tokyo, 1969.

Tackling the Problem

From the discussion presented above, a broad approach to the problem of increasing productivity may be derived. When we consider this aspect, we are moving from generalities to specific situations. Every economic activity has productivity implications and this has to be examined in detail for achieving higher productivity. The cumulative achievements of higher productivity of individual activities constitutes higher productivity in the aggregate at the national level, This idea is illustrated in the model shown in Figure 3.

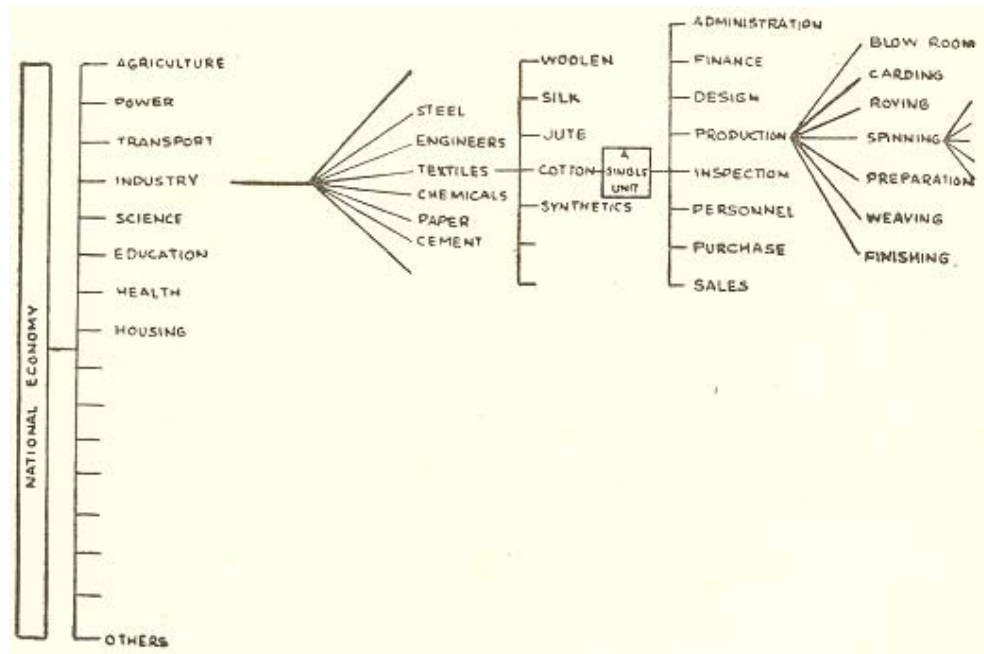


Fig. 3 : Visualisation of Cumulation of Economic Activities Emphasising Micro Approach to Achieve Results at Macro Level

In this micro-approach (that is, tackling every economic activity for achieving results at macro-level) two basic elements are involved: Technological and Managerial, including management of human resources. Technological innovations contribute significantly to increase in productivity. Of course, such changes of technology occur over periods of time. At any given point of time, we would be interested in the effective utilisation of the technology and, therefore, at any given level of technology managerial aspects assume importance. This techno-managerial approach concerns with the utilisation of resources, including human resources, effectively for achieving higher productivity. This micro-approach will be discussed in detail later.

The definition of productivity as the ratio of output/input, itself suggests alternative ways to increase productivity; being a ratio any increase in the value of the ratio indicates an increase in productivity. We may increase the numerator, keeping the denominator same; may keep the numerator same, but reduce the denominator; or a slight increase in the denominator with proportionately higher increase in the numerator-all these variations increase the ratio.

It should be emphasised that productivity improvement is not purely a technique-oriented approach. Though we have given a definition of productivity it may not convey all that it stands for at least in terms of achieving higher productivity; achieving higher productivity is such a complex combination of factors that any single definition may not bring out all that it implies and means. The following definitions are quoted in order to bring home the diversity of its implications:

Productivity is war on waste and inefficiency; utilisation of resources effectively; it is a way of life and an attitude of mind; it is a constant and continuous effort at improving things; it means motivating people to do things better.

The European Productivity Agency has aptly summarised the position in the following words: "Productivity is an attitude of mind. It is a mentality of progress, of the constant improvement of that which exists. It is the certainty of being able to do better today than yesterday and continuously. It is the constant adoption of economic and social life to changing conditions; It is the continual effort to apply new techniques and new methods; it is the faith in human progress."

2. Anatomy of Productivity

Productivity Measurement

Productivity has been defined as the ratio of output to input. The input or "input factors" may relate to anyone or more or all the factors employed in producing a given output. Thus one may speak of productivity of labour, capital, material, power, machines, etc., or any combination of the inputs. This brings to choice of factors for use in the productivity measurement in any situation and consequently the interpretation of the concept of measurement used. However, in practice the choice of factors is limited to those cases where measurements are possible. The practical meaning of productivity is the effective utilisation of resources or "input factors". * It is to be appreciated that there is no absolute value for productivity in any given situation, and when one talks of higher productivity, it is relative to the past period, or to some other standards, which may be another similar producing unit or even other nations. Since productivity is expressed as a ratio, higher productivity can be achieved in several ways namely, keeping the output same and reducing the input factors; for the same inputs obtaining higher output; or effecting changes in both output and input in such a way that the ratio becomes higher compared to previous period. Improvement in the 'quality' of output for the same output and input may also be viewed as higher productivity.

Measurement of productivity, as is the case with measurement in any other field, provides information as to the level attained, rate of growth, utilisation of resources, and consequently pinpoints the critical areas and factors which impede productivity at various levels-plant, industry and global; it also permits comparisons at various levels. Productivity Measurement thus forms its basis for planning, evaluating and taking appropriate measures for improving productivity at various levels, contributing to more rapid economic growth.

The overall productivity of industry, or any other sectors, would be of great interest in the general economic analysis. The contribution of individual sectors

*It is to be noted that Productivity Measurement does not say anything about the optimum utilisation of resources. That is, measurement of productivity does not tell us that the production process is most efficient.

adds up to the national productivity. "The rate at which average levels of productivity rise in different sectors is a true measure of the pace and quality of the advance achieved ... the only enduring basis for the strength and dynamism of the economy is a rising level of productivity ..."³ The industry-wise studies bring out the aspects of commonness and differences between industries and within an industry in productivity levels, and also highlights the technical, economic and managerial aspects and their contribution to higher productivity. The productivity measurement at plant level might relate: to the whole plant; to individual processes; and to individual operations and operatives. The object might be to throw light on any aspect of 'managerial effectiveness' in an individual plant or group or plants under the same management.

A popular measure of productivity is the productivity of labour. Labour productivity is measured by the ratio of quantity of output produced to the labour input measured in units of time, which is output produced per unit of time. However, to use labour input as measure of productivity or for that matter, the use of any one factor alone as a basis for measuring productivity tells 'only part of the story' and the part provides an insufficient explanation. This point is elaborated in the following paragraphs.

L. Rostas⁴ maintains that labour productivity is the most appropriate concept for measuring productivity. "We have made it clear in our terminology that we regard productivity of labour as a measurement of general efficiency in the use of labour and not of the effort of the labour which later is obviously too narrow to be of much value. We have also stated that productivity of labour is influenced by the combined effect of a large number of separate though interrelated factors such as the amount and quality of equipment employed, technical improvements, managerial efficiency, the flow of materials and components, the relative contributions of units at different levels of efficiency as well as the skill and effort of workers ... Its importance is derived from the central position of labour and is particularly appropriate for a society in which, in Marshall's words, man is both 'the end and an agent of production'. It is through this dual role that productivity of labour becomes an important indicator of the standard of living". This appears to suggest that productivity of labour may be reckoned as a measure of general industrial efficiency.

3. The Third Five Year Plan, Planning Commission, Government of India, 1961.

4. L. Rostas, *Alternative Productivity Concepts in Productivity Measurement*, Vol. I, pp. 31-42, European Productivity Agency.

On the other hand, Fabricant⁵ points out that 'Indexes of Productivity based on the comparison of output with the input of both labour and tangible capital are better measures of efficiency than those based on labour input or capital input alone.' He also mentions that though this index is 'broader than any other indexes now available, it fails to cover adequately the investment in education, science, technology, and social organisation that serves to increase production'.

It should be mentioned that at least in the developing countries with large population, the concept of labour productivity may be misleading. The concept of labour productivity has created the impression that in order to obtain higher productivity, it is necessary to retrench labour and install labour-saving equipment. This view of productivity should not be allowed to linger as it would hamper the growth of productivity and productivity movement. It should be made as a policy statement that productivity increases have to be achieved with methods and means best suited to individual societies, taking into consideration the maximum utilisation of available labour. It follows, therefore, that in developing countries a complete picture of productivity can be obtained by considering not only labour productivity but also other related measurements appropriate to the situation; for example, capital equipment or machine utilisation, material utilisation, efficiency or management, etc.

Productivity change

The measurement and interpretation of productivity changes is of great significance as it explains the cause for the changes; "partitioning" the quantum of observed changes to various sources that cause the same would be the purpose of measurement study in depth. Theoretically, it would be easy to enumerate the sources that would contribute to higher productivity: the quality of the labour force, effective (not merely longer) work, better capital equipment, technology, better management, social organisation which provides motivation and incentives and the like. Some broad conclusion based on actual studies in the measurement and interpretation may be mentioned.

Melman⁶ has concluded: "The dramatic rise of industrial productivity over the last century is traceable primarily to transformations in the technique of

5. Fabricant in Productivity Trends in the United States, J.W. Kendrick, National Bureau of Economic Research, New York. For calculation of Total Factor Productivity (TFP). (i.e. taking both labour and capital into account) the formula used is $TFP = \frac{P_0 Q_t}{W_0 L_t + Y_0 K_t}$ where Q_t and K_t refer to the quantity of output, labour and capital during the current period and P_0 , W_0 and Y_0 are the base year prices for output Q , labour L & capital K respectively. This index is also called the Arithmetic Index.
6. S, Melman, Dynamic Factors in industrial Productivity, John Wiley and Sons Inc. New York, 1956.

Production. at the same time techniques for organising production have been evolved

Kendrick⁷ found for the United States economy, for the period 1899 to 1957, the only one half of the growth of the national product could be attributed to the increased inputs of labour and capital and the other half was caused by other factors, particularly attributed to "technical progress".

The above results of Kendrick have also been confirmed by other researchers using the production growth formula. ⁸ For instance, Denison⁹ in his study on the allocation of growth rate of total real national income among the sources of growth, 1929 to 1957 for the United States of America has shown that out of the total growth rate of 2.93 per cent, 1.3 per cent was accounted for increases in the use of capital and labour and the rest 1.6 per cent, half of the growth was caused by "technical progress"; "technical growth" was broken down into education and research, economies of scale and other factors. It is interesting to note that education and research contributed to 1.25 per cent of the total growth.

In an attempt to explain the changes in labour productivity, Salter¹⁰ has examined the movement of labour productivity in a number of British industries between 1924 and 1950. The empirical analysis is based on a comparison of the experience of twenty-eight industries. Movements of output, employment, output per head, prices, costs / and earnings are compared over the period of 1924-50. Salter points out that the interpretative conclusions derived from the analysis where each industry is treated as an observation reveals sizeable associations between movements of many of the variables. These coefficients appear to reflect underlying real associations even when allowance has been made for the statistical problems of skewed observations, errors of observation and deficiencies in the samples.

7. J.W. Kendrick, Productivity Trends in the United States, op. cit.

8. The Cobb-Douglas Production Function with a trend component can be expressed as follows:

$$O = cK^a N^b e^z$$

where O output, K = Capital and N = employment and c, a, b, and z are constants. This function assumes that the growth rates of output ($\Delta O/O$), capital ($\Delta K/K$) and labour ($\Delta N/N$) measured as annual percentage increases are related to each other through the relation:

$$\Delta O/O = a\Delta K/K + b\Delta N/N + z.$$

Where a and b are constants and z, residual, can be taken to represent the annual percentage increase in output due to technical progress.

9. Edward F. Denison; Source of economic growth in the United States and the alternative before us, Committee for Economic Development, New York, 1962. As given by Odd Aukrust Productivity Measurement Review, February, 1965.
10. W.E.G. Salter, Productivity: A Technical Change, Cambridge University Press, 1960.

On the basis of the inter-industry co-relation studies, Salter¹¹ observes: "The most appropriate means of deriving an explanation of the pattern of results is to consider alternative causes of increases in productivity: increased personal efficiency of labour, factors of substitution, technical change and economies of scale. Each such cause may be expected to involve a distinctive pattern of inter-Industry cost and price behavior and by examining the observed data we may derive the explanation of the productivity movements which is most consistent with the results".

Based on the studies as explained above, Salter draws the following conclusions:

- (i) The hypothesis that the increases in labour productivity originate in greater personal efficiency of labour is rejected.
- (ii) The hypothesis that the results are principally the product of factor substitution is unsatisfactory.
- (iii) The results are consistent with uneven rates of technical advance between industries when these advances are of the type which tend to save labour, capital and materials.
- (iv) The results may also be partially explained, by the uneven impact of economies of scale.
- (v) Although he suggested explanation places primary emphasis on technical change and economies of scale, this does not mean that factors of substitution and the personal efficiency of labour are unimportant.

Hollander¹² has done a penetrating analysis of the causes of productivity change. He has also mentioned various studies with regard to the interpretation of productivity change: in essence, these studies suggest that the increase in output per head in the United States is mainly the contribution of "technical change" than that of growth of resources per head. However, the importance of the macroeconomic studies' conclusion is reduced by the broad character of the technical change, which includes causes like economies of scale, changes in the efficiency of resource allocation, improvements in quality, technological improvements, improved managerial efficiency and the like, in fact all causes excepting that of increased inputs. Obviously, any study that would pinpoint a cause in a clear way would be of great significance. In order to obviate the problem of the type mentioned above, Hollander has carried out a micro-study of the Du Pont Rayon Plants for the period 1929-1960. Hollander defines the 'technical change' thus: "By the term

11. Salter, op. cit., p. 145.

12. S. Hollander, *The Sources of Increased Efficiency. A study of Du Pont (Rayon Plants)*, The M.L.T. Press, Cambridge Massachusetts, U.S.A.

'technical change', we shall refer throughout this study to changes in the technique of production of given commodities by specific plants designed to reduce unit production cost. These changes in technique may be of a 'technological' nature; they represent the introduction of different or improved inputs from those hitherto used at the plant; or they may be 'managerial' and consist in improved organisation of work and the like. It is intended, however, that the term should apply only to such changes which are brought about by a deliberate decision to reduce costs, although it is not necessary that the decision be taken by 'higher-ranking' management. Specially the problems relate to :

- (i) Cost reductions observed at particular plants as a result of changes in the technique of production;
- (ii) relationship between scale and technical change;
- (iii) relationship between the various changes in technique and investment in plant and equipment,
- (iv) rate of introduction of new technology into the economic system, particularly the role of formal research activities as contrasted to small improvements in technique.

The study is concerned with changes in unit cost than with improvements in quality of the product, as the former can be quantitatively defined. The main conclusions of this micro-study at various plants were:

- (i) The contribution of 'technical change' was of overwhelming importance; in fact, it varied from 95 to 100 per cent in the various plants in terms of total net reduction in unit factory costs. Improved inputs and improvements in organisation are included in technical changes; it has been found in the case of textile-yarn plants approximately 2 per cent of the unit cost reduction was attributable to improved wood pulps; in the case of tyre-cord plants the proportion was between 10 to 15 per cent: the contribution of improved labour and better organisation varied between plants and generally accounted for less than 10 per cent of the entire net reduction in units resulting from technical change.
- (ii) The contribution of plants expansion was relatively small, compared to that of technical change, amounting to 15 per cent.
- (iii) The studies reveal that over 80 per cent of the cost reductions resulting from technical change at each plant depended upon investment. Replacement investment was of particular importance, usually at least two-thirds, and in some cases as much as 90 per cent or the investment outlays required to implement technical change represented replacement of, or

13. Hollander, op. cit., p. 202.

alterations to, existing equipment. It is further pointed out that though the studies have shown 'significant' changes, it is possible to make the existing plant yield volumes of output as efficiently as a new built plant and the outlays would be relatively small compared to new plant. In this connection, Hollander¹³ further points out : "There is a growing body of evidence, at the micro-economic level that even without new investment it is possible to raise the efficiency of existing plants. Thus, for example, the Horntail Works in Sweden had no new investment for a period of fifteen years and yet output per man-hour increased by 2 per cent annually. A recent study comparing the rates of growth and investment in several European countries and the United States within the last decade presents data which shows that no country achieved a very rapid growth without a high rate of investment although a number of countries which did invest heavily failed to achieve a high growth rate."

- (iv) Another interesting conclusion is : "Much new technology appears to be generated as a by-product of current production; our study tends to support the view, to some extent, that a considerable portion of 'technical change' can be ascribed to experience, that is, to the very activity of production which gives rise to problems for which favorable responses are selected over time".

It is apparent that the above types of penetrating studies are important; the lesson to be learnt is not that the considerations mentioned are applicable to all situations and economies with equal force. The state of technologies and its applications differ in different economies and as such the need for studies which evolve to partition causes of increased productivity is of considerable use. The possibility of increasing productivity within the scope of existing technology is also of great significance.¹⁴

In continuation of the interpretation of productivity changes both at macro and micro-level two interesting relationships may be presented."¹⁵

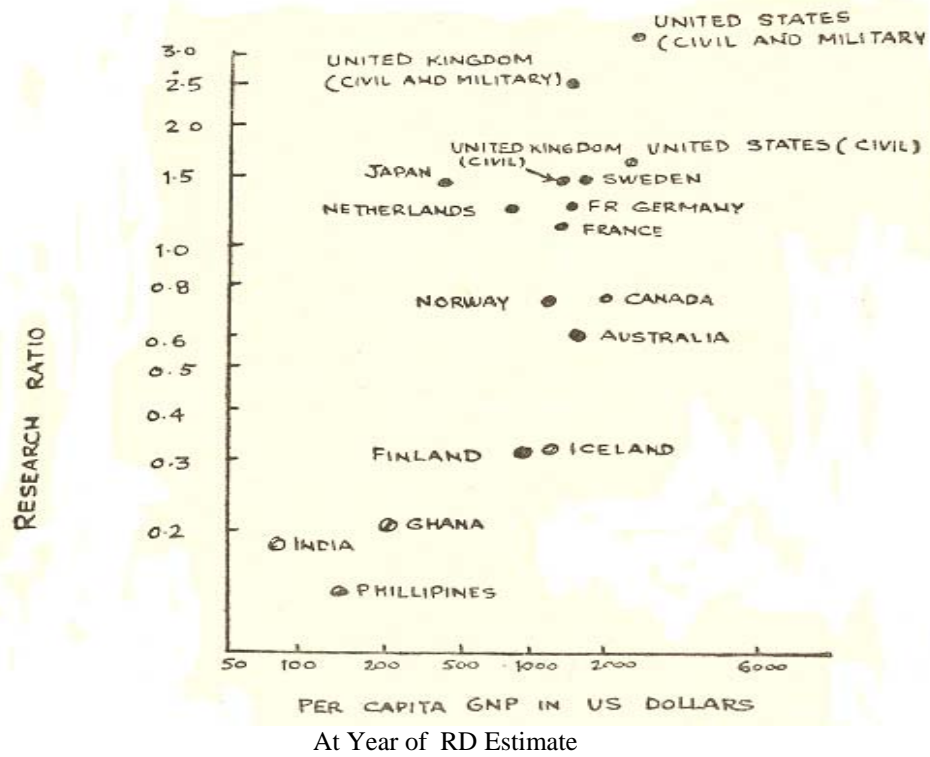
- (i) Research and Development Expenditure in relation to per capita GNP (at market price): Figure 4.

- (ii) Power Generated at National Income in various countries of the world; Figure 5.

14. This aspect will be dealt in some detail in the next chapter.

15. From the OECD Observer (1963).

Research and Development Expenditure in Relation to
Per Capita GNP (At Market Prices-1961 or
Nearest Year)

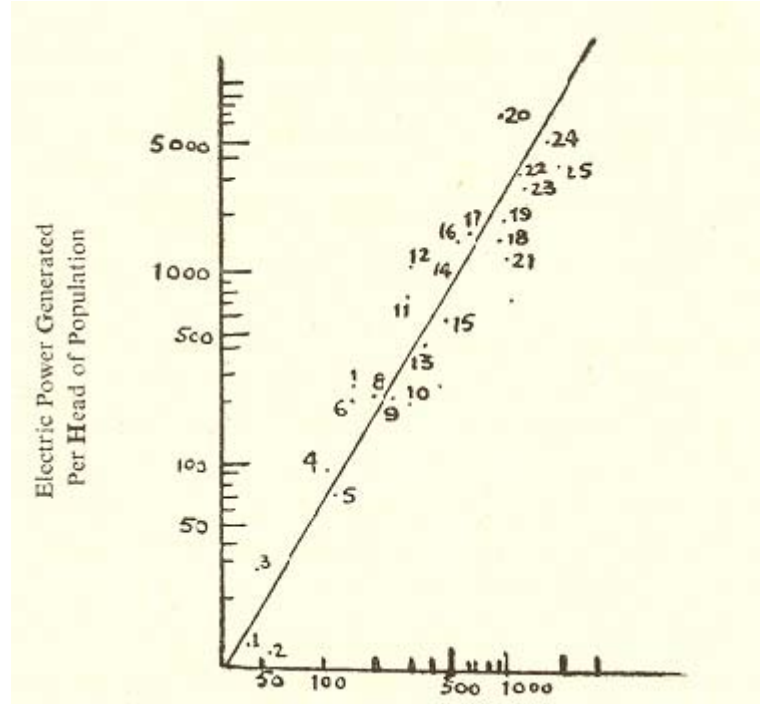


$$\text{Research Ratio} = \frac{\text{Gross National Expenditure on R \& D}}{\text{Gross National Products Market Prices}} \times 100$$

Source: OECD Observer

Figure 4

Relation between Power Generated and National Income in various countries of the world
(1957)



- | | | | |
|-------------|---------------------------|-------------------|-----------------|
| 1. Pakistan | 8. Mexico | 14. Italy | 21. France |
| 2. India | 9. Portugal | 15. Ireland | 22. Sweden |
| 3. Nigeria | 10. Greece | 16. Austria | 23. Switzerland |
| 4. Turkey | 11. Japan | 17. Finland | 24. Canada |
| 5. Iraq | 12. Union of South Africa | 18. Australia | 25. USA |
| 6. Brazil | 13. Spain | 19. Great Britain | |
| 7. Rhodesia | | 20. Norway | |

Source: OECD Observer

Figure 5

A Profile of Productivity:

There are specific reasons for discussing the American scene with regard to productivity in some detail. Firstly, United States of America had done extremely well in all sectors of the economy and has been able to provide standards of living for its people that are undoubtedly high. Secondly, many groups of people from all over the world have studied the American Productivity and have documented the same.¹⁶ Thirdly, these are lessons which are applicable to developing economies and therefore, a study of the same would be worthwhile.!

The American Economy is characterised by high production and high consumption.

A brief summary of the American Productivity may be given: In the last 100 years output has doubled every 25 years: American industrial output has roughly doubled between 1939 and 1950. By 1975, it is expected to be double of that in 1950.

About 60 years back American worker turned out roughly the same amount as his counterpart in U.K., Germany, France and enjoyed broadly the same standard of living. Today he turns out 2 to 5 times as much.

Eight hours of work buys for an American from 1 $\frac{1}{2}$ to 4 times the quantity of goods that eight hours buy per British or West German worker. Table 3 summarises the situation nicely. The consumption per head has risen more than 50% above the pre-war level.

TABLE 3: How Many Men Per Job?

(Number required to produce the same output as one man in United States)

Country	Steel	Chemical	Metal Products	Electrical Machinery	Transport Equipment	Non-Electrical Machinery
United States	1.0	1.0	1.0	1.0	1.0	1.0
Britain	2.3	3.4	2.2	4.2	3.2	3.5
West Germany	1.7	2.6	3.2	3.8	2.4	3.2
France	1.6	3.0	3.1	2.6	2.0	2.3
Sweden	Not available	2.5	2.6	2.3	1.4	1.9
Italy	1.2	2.5	4.2	2.3	2.1	2.4

Source: The Economist Oct. 1, 1966.

16. See G. Hutton, We Too Can Prosper, The Macmillan Co., New York, 1953.

17. Discussed from the point of view of material progress; problems of affluent economies are not considered.

Dr. Rostas¹⁸ has shown that the ratio of horsepower per worker in the U.K., and the U.S., bears the same relation as the ratio of output per worker in the U.K. and the U.S., i.e. broadly speaking, output per worker is double in the U.S., and horsepower per worker is also double. Also the higher rate of increase in horsepower per worker in the U.S. runs parallel with the higher rate of increase in output per worker." The studies of the Anglo-American Council on Productivity also confirm the same.

In addition to this high production-consumption aspect, there is enough leisure to enjoy the higher standards of living achieved; this prosperity is certainly due to higher productivity of the American economy.

The major source of the causes for this high productivity is traceable to changes in the technique of production or technology, efficient management, human relations based on enlightened understanding, incentives in and out of industry and certain in-built characteristics of the population may be termed as cultural aspects.

Changes in technique of production and its impact on productivity have been already discussed; more specifically these relate to powered equipment in all processes and techniques of organising production. To cite an example, the coal production in the USA was 2t tons per man per day about sixty years ago; during 1953 it was 13 tons per man per day. The worker earned more money and did not work any harder.

Almost all the productivity teams which have visited USA (both British and Indian and others) have spoken in superlative terms in respect of management in USA. There is quality in management which gets better results; the methods adopted are simple, clear and quick. Any new discovery or change that might be developed in their research department and found worth while, would be introduced into production process at the earliest.¹⁹ The enlightened understanding as to duties and responsibilities for the preservation of high material standard achieved and the democratic way of life, recognition of merit, evaluation and the prompt action appear to be the characteristics of the dynamic management in U.S.A. The implications of good management as revealed in the Anglo-American Council on Productivity Teams findings can be listed as²⁰ :

- (i) Training of its personnel, from shop-floor to office, in its special skills, both within and outside the firm;

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- 18. L. Rostas, Comparative Productivity in British and American Industry, Cambridge University Press, 1948.
 - 19. Quality Control in Japan, USA and Britain, Published by the National Productivity Council of India, 1963.
 - 20. G. Hutton, op. cit., 129-30.

- (ii) the appropriate organisation to 'spot' managerial talent, train it, give it the right kinds of experience, and promote it, with sole regard to its merit and efficiency;
- (iii) provision, awareness and utilization of detailed measurements of all productive 'performances' and costings thereof;
- (iv) organisation and administration of managerial skills to secure the most efficient, effective, and economical controls over productive processes;
- {v} use of (i) to (iv) inclusive to secure the highest possible degree of utilisation of machinery (including maintenance), materials, fuel and power, manpower and any other ingredient in the productivity processes;
- (vi) the pre-planning of all operations to secure the smoothest and fastest flow through all the productive processes;
- (vii) the closest and best team work in and between all departments, and the measures to secure it;
- (viii) close and continuous pressure for greater standardization, simplification and specialization of components or processes and of end products;
- (xi) close and continuous pressure for research, experimentation, modifications, and improvements;
- (x) an artist's awareness for the human tolerance within which all these conditions can be fulfilled.

Human relations in the American Society and particularly. in the American industry have several striking features. The first is the growth of trade unions, their membership, resources, specialised knowledge, and their ability to negotiate on equal terms with management. Second is the willingness of management to share all the available information with trade union personnel; the success of human relations, probably, lies in "the deep conviction of both American management and labour that 'the American way' of high and rising wages, high and rising real material standards of living, and reasonably high and rising profits for private enterprise {including profits distributed to private stockholders, who in America are more broadly spread among various income-groups than in (Britain), depends on their joint success in keeping productivity high and constantly rising. They also seem to be convinced that high and rising productivity depends on intense utilisation of machines and men, which in turn depends on their own high co-operative efficiency.²¹ This is in contrast to the traditional prejudices and distrust that may be noticed in the developing countries. Thirdly researches of social scientists in USA have provided a deep understanding with reference to people at

21. G. Hutton, op. cit., pp. 143-44.

work-individually and in group-in various situations. Lastly, which is true of the whole American population, is that they are not afraid of changes-whether they are changes of jobs, houses, or places; their adaptability to new situations and mobility has been a great contribution to the maintenance of good relations, as this takes care of the 'shifts' consequent on productivity improvements.

The three elements namely, technology, management and human relations, appear to be of much importance for developing countries. In addition, (here are many other aspects in the American economy, such as incentives in and out of industry, and other characteristics of the economy and people, which have been responsible for the present status.

3. Increasing Productivity

Productivity Techniques

In the drive for increasing productivity the effective starting point is an individual unit, a factory, a farm, an office etc. The cumulative effort at individual level and in the various sectors of the economy adds to the national wealth, which in turn is distributed to the people contributing to higher living standards for the people. Thus the techniques which help in increasing the productivity at unit level assume great importance. The range of productivity techniques is really very wide. Techniques for achieving higher productivity may vary from application of fundamental and applied research studies in developing new products and processes, speeding up of existing processes through mechanization and automation, to utilization of existing resources effectively and motivating people to achieve higher productivity. Of course, the results achieved will vary. These aspects of increasing productivity have been well brought out •• s described below.²²

"Prof. I. B. W. Benenschot, who draws distinction between technical measures (which usually require substantial capital investment) and organisational measures for increasing productivity, believes that in general the first are about three times important as the second in increasing to productivity. The importance of methods of increasing productivity without adding investment becomes all the greater when one thinks in terms not of labour productivity alone, but of making the most efficient use of all resources taken together. In underdeveloped countries especially, lack of capital and abundant labour often makes it more important to increase output per machine or per unit of capital than output per worker."

Thus, when one speaks of productivity techniques, they generally relate to those techniques which require little or no capital, but contribute to the increase in productivity, though other methods are not ruled out of consideration.

Nature of Productivity Techniques

The nature of productivity techniques can be appreciated by first discussing productivity and level of technology. This is shown in Figure 6. Productivity

22. Higher Productivity in Manufacturing industries, ILO Publication, 1954, p. 79.

achieved in terms of results (output and cost) has different implications at different levels of technology. The implication of Figure 6 is that the results of research and its application can bring about spectacular increases in productivity. To appreciate this, one has only to scan the improvements that have come about in all fields speed of transportation, coal mining, agricultural production, life-saving drugs, communications, etc., over the last century.

It is also important to recognise that at each level of technology, effective utilisation of resources is of greatest importance; otherwise, maximum benefit in terms of improved quality, higher quantity, lower costs and improved services would not be achieved. This brings to the fore that at any given level of technology the pacing factor is management of technology.

Again at each level of technology, for effective performance, technological economic and human aspects have to be taken into account; for in any economic activity these three aspects would always be there. Successful management implies management of these aspects, as shown in Figure 7.

This visualisation presupposes that management:

- (i) will be on the look out for improvements constantly;
- (ii) implement changes, technical or otherwise, that are worth-while and economic;
- (iii) has the ability to adapt to new situations; and
- (iv) see future trends both in technology and management.

The implications of productivity and technology at the unit level, even in the short run, may be appreciated with the aid of an example,²³ where the output per man-hour in selected industrial operations using alternative methods are shown, as in Figure 8 This may be distinguished from the outputs achievable at different levels of technology, for example, transportation, from ox-cart stage to supersonic transport, which may be termed as long range improvements.

Some Productivity Techniques

A brief description of some of the productivity techniques is given below. It is to be emphasised that it is not an exhaustive list of productivity techniques. The techniques described are: Work Study and Incentives; Quality Control and Material Management, Role of Standardization; and Quantitative Method. In addition

23. S. Melman, Op. cit., p. 15

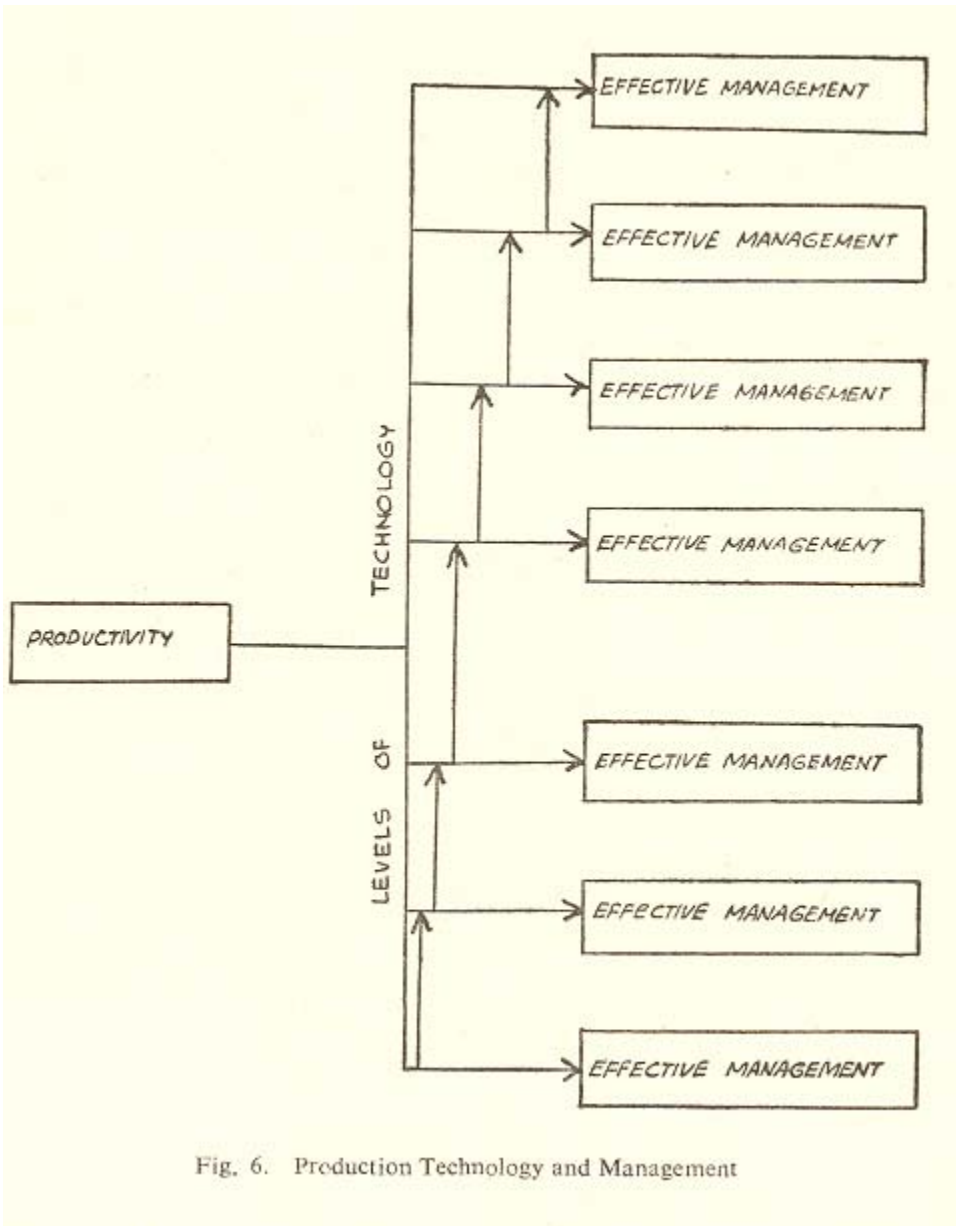


Fig. 6. Production Technology and Management

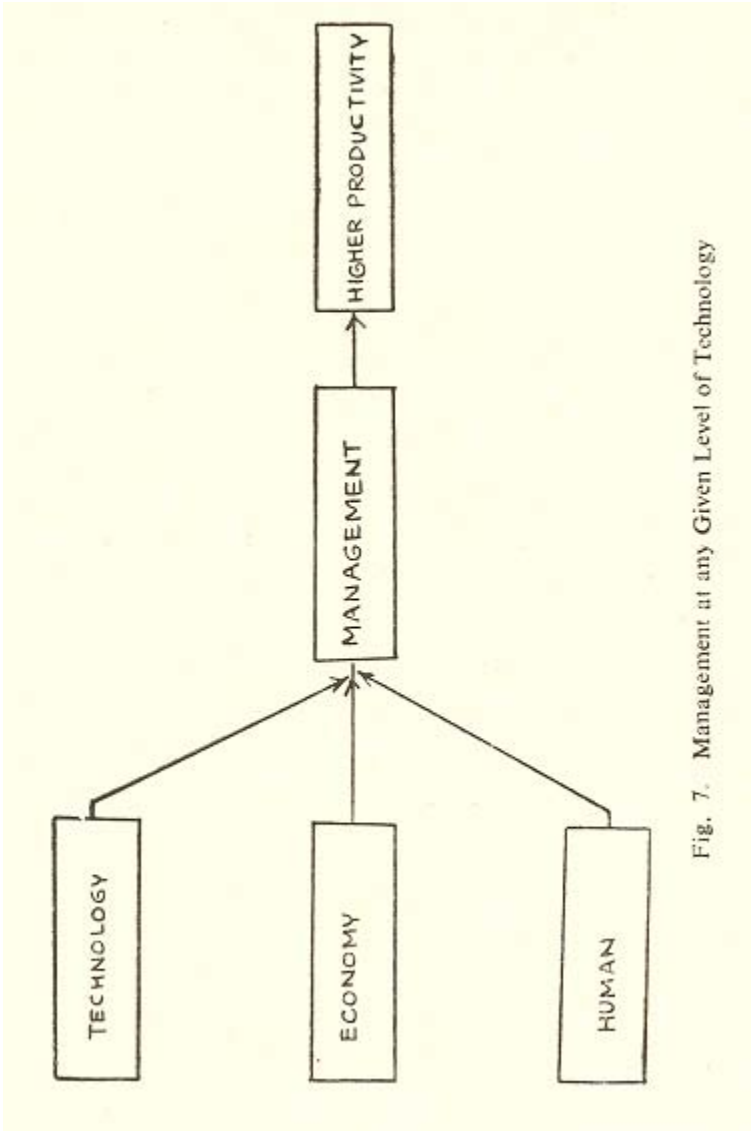
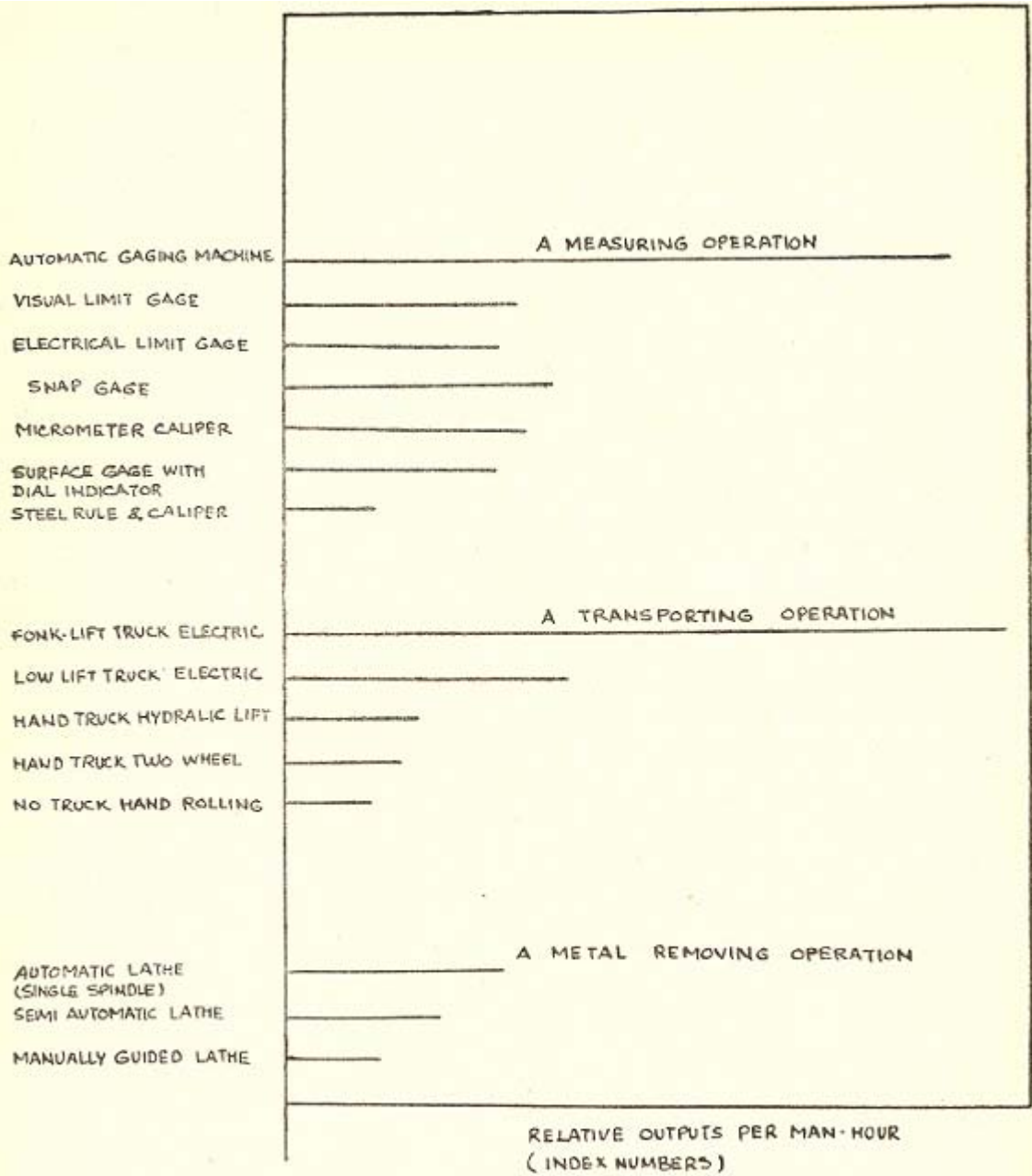


Fig. 7. Management at any Given Level of Technology



OUTPUT PER MAN IN SELECTED INDUSTRIAL OPERATIONS USING ALTERNATIVE METHODS

FIG. 8

the importance of human relations and the need for equitable sharing of the gains of productivity have been emphasised.

Work Study embraces two techniques-namely, Method Study and Work Measurement. Method Study is concerned with the 'best' way of doing a job and Work Measurement tells how long it should be taken to do the job. The improvements in methods come by rearrangement of work place, movement and handling of materials, designing simple jigs and fixtures and modifications. in the design. The Method Study and Work Measurement together provide basis of determining standard outputs in sections, departments and in the whole plant. Those standards again provide a basis for introducing incentive schemes on scientific lines.

Incentive schemes, when properly introduced, should achieve two things simultaneously, first the cost per unit of the product must come down and secondly, provide an opportunity for workers to earn more wages. It is said that the scope for increasing productivity through incentives is very great. "In many of the Indian factories a good incentive plan would eventually increase effort by over 100%"²⁴.

The following table gives examples of rise in productivity in some of the Indian factories where incentives are in operation.²⁵

TABLE 4

<i>Type of Industry</i>	<i>Productivity before incentive</i>	<i>Productivity after incentive</i>
Medium Engineering	38	65
Cast Iron Foundary	42	64
Ship Repair Yard	33	45
Manual Transporting Group	36	72
Small Repair Shop	48	70
Small Size Production Unit	37	60

The Modern Quality Control activities have been broadly defined as under.²⁶

"The ultimate object of all Quality Control (QC) endeavour is to provide quality

24. R.L. Mitchel, ILO Expert in Productivity, Journal of National Productivity Council of India, Vol. 2, No.5.

25. M.K. Ramananda, Productivity. Vol. 2, No.5.

26. General Professional Council, American Society for Quality Control.

assurance of the finished product and to assure optimum quality costs for that product. To accomplish this objective, every producer needs an integrated programme for the control of product quality including its reliability element, which encompasses the planning, the control, the evaluation and the reporting of all quality aspects of the product from its conception through manufacture, processing, storage, delivery, installation, maintenance and repair to the end of its service life. "

The impact of Quality Control will be felt when the analysis of quality costs is presented²⁷. The components of quality costs are:

Prevention Costs : are for the purpose of keeping defects from occurring, in the first place. Included here are such costs as Quality Control, Engineering, Employees, Quality Training and Quality Maintenance of pattern and tools.

Appraisal Costs : include the expenses for maintaining company quality levels by means of formal evaluations of product quality. This involves such cost elements as inspection, test, quality audits, laboratory acceptance, examination, outside endorsements.

Failure Costs : are caused by defective materials and products that do not meet company quality specifications. They include such loss elements as scrap, spoilage, rework, field complaints, and so on.

Clifford²⁸ in a paper says that quality costs in many companies (in American industries) are in the same general region as total company profits. In the absence of any formal studies on quality costs, he estimates the quality costs components as:

Prevention	20	10
Appraisal	%	%
Failure	50%	40%

British experience²⁹ suggests that the cost of providing quality assurance can amount to 12% of total turnover, and the break up of the costs involved would be

80
%

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27. A. Y. Feigenbom, *Industrial Quality Control*, May 1957; see also his book. *Total Quality Control*, McGraw Hill Book Co.
 28. Paul C. Clifford, *International Conference on Quality Control*, London, 1960.
 29. Frank Nixon, *SQC Conference Papers*, Madras, 1967.

as under:

Failure costs	
Appraisal costs	65%
Prevention costs	30%
	5%

Further experience of application of effective quality control in some companies reveals that by increasing the prevention costs slightly by about 5% the other costs could be reduced considerably, by about 35% of the total quality costs. If one were to make such estimates in Indian Industries, a rough guess would be that we spend much less on prevention, though the appraisal and failure costs have been guessed at 20% of the total sales turnover. A slight increase in prevention costs would bring down the appraisal and failure costs drastically, the increase in prevention costs being a small fraction of other costs.

Quality Control methods not only provide a definite quality assurance, but also provide a basis for reducing the cost, and this is exactly what is needed in India at the present juncture. Experience has shown that it is not just sufficient to produce a product, but also with it one must produce an information system capable of answering questions pertaining to product and processes. Through this approach a better understanding of the process is obtained which helps in improving the quality and at the same time reducing the costs.

It is well known that in any industry generally 50 to 60 percent of the costs are due to materials; it, therefore, becomes necessary to give attention to materials management. *Materials Management*, in the broadest sense, emphasises the effective utilization of materials-raw, in-process and finished. The basic problem for any industry is to stock materials at economic levels that are best suited for producing the required quality products. Some of the techniques that have been employed in this field are ABC Analysis that tells which are the important inventories that require attention; Economic Order Quantity, which assists in determining the right purchase quantity, and techniques like classification and coding, value analysis, standardization of materials, processes and products, layout and handling which assist in physical control over materials; better purchasing procedures, source selection, and effective vendor relations which help the effective management of materials.

The advantages of these procedures are : reduction in the capital locked up, reduction of obsolete materials, remedy for over and under stocking and ensuring the availability at the right time and prices and increasing rapidity of turnover. Apart from these, economy in floor space and labour and clerical expenses can be achieved which will assist in reducing the overhead expenses. Opinions have been

expressed in many quarters that it is possible to show reductions in inventory, ranging from 30% to 50% of its original value by the use of the techniques mentioned above.

Standardisation in a developing economy plays an important role in hastening economic development. If the developing countries have to catch up with the industrially advanced in as short a period as possible, they cannot afford to allow their industries to go through the same experience. They can bypass the eighteenth and nineteenth century problems experienced by the developed countries by the judicious application of standardization from the earliest stages of planning, design and establishment of industries. The modern form of organised standardization is as much an instrument of direction and coordination as of efficient production and distribution; its application at early stages ensures interchangeability and eliminates the need for the reduction of variety. The rate of economic growth of developing countries depends, to a large extent, on systematic and rational development of the industrial sector on the basis of the latest achievements of science and technology. Some of the major problems that countries have to tackle in the process of introducing balanced industrialization on a broad front centre around the following points:

- (a) Closer integration and co-ordinate development of different types of industries, both in the small and large-scale sectors considered viable for the country's economy;
- (b) Optimum utilization of available human resources and material resources, maximum use of capital equipment and systematic exploitation of unexplored resources;
- (c) Rapid development, and provision of power, transport, communication and marketing facilities;
- (d) Rapid transfer and maximum use of the accumulated wealth of technical know-how and practical experience from the industrially advanced countries with a view to evolving correct procedures for installing and maintaining heavy machinery such as transformers, rectifiers, boilers, etc. and minimizing wastage during handling, processing, transport and marketing of products;
- (e) A check on the growth of an unnecessary variety of materials, parts, tools and appliances, and an assurance of their interchangeability;
- (f) Assurance of consumer satisfaction of products through their quality, serviceability and workmanship at economical cost;

(g) Raising the quality and quantity of exports to augment foreign exchange resources to freely enable importation of capital equipment, machines components, specialized items and basic raw materials;

(h) Bringing the results of applied research expeditiously to the doorsteps of industry and consumers.

Organised standardization provides effective solutions to the 5e problems and helps developing countries to change over to an industrial economy in a systematic and orderly manner.³⁰

During the World War II, Scientists from a wide variety of fields came together to solve complex problems encountered by defiance forces. These methods and approaches have also found applications to industrial and other situations and are generally termed as *Quantitative Methods*. These techniques developed make use of mathematical and statistical tools in the formulation and solution of problems; the major technique under this category is now known under the title Operations Research (OR).

The essential characteristics of OR³¹ are the use of a team and interdisciplinary approach, use of mathematical models in the formulation and a systems approach to the solutions of problems. Attempt is made in quantifying all the varieties and a 'best' answer obtained under specified assumptions. Linear Programming, Queuing Theory, Replacement Analysis are some of the popular techniques of OR. The reason for 'team' and 'system' approach may be briefly explained. Any organisation is considered as a social (or man-machine) system. In an organisation any activity in one part of the organisation will have a relation with other activities in other parts of the same organisation and an approach that takes into consideration all these activities together form a systems approach to the solution of problems. Further man-machine systems may have to be examined from a variety of aspects engineering, biological, Sociological, psychological, economic, etc, and therefore can be effectively, studied by individuals specialised in these areas. This is the implication of 'team' approach.

In the ultimate analysis, it should be emphasised that productivity techniques can bear fruitful results only in an atmosphere of good *human relations*. Particularly at the plant level, good labour-management relations are absolutely essential.

30. Industrial Development and Standardization, The International Industrial Development Organisation (UNIDO).

31. R. L. Ackoff and P. Rivett, A Manager's Guide to Operations Research' John Wiley & Sons, 1964.

Here, there are two aspects to consider: First, the management and second the labour union. It should be appreciated that, 'Management is the skill with its own discipline and fields of knowledge'. A union of workers (well supported by all workers) with good leadership that appreciates the problems of management, and can negotiate with the management on the problems of workers is also essential. A well-trained management and a trade union, with mutual understanding of each others' problems, can create an atmosphere required for increasing productivity.

The importance of good human relations may be gauged from the following statement. 32

The direct incentives will increase production by 20 to 50 per cent but 'the ingredient! find in excellent companies has a potential that overshadows the productivity increase achievable through industrial engineering techniques. When we learn to manage people, the increased productivity will be linked to the relationships of the water wheel to nuclear energy'.

Sharing the Gains of Productivity

It has been discussed earlier that the implication of higher productivity is that the cost per unit must come down. This may happen in one of several ways; lesser input for any given output; more output for given input; or changes in both input and output such that the present ratio would be higher as compared to the previous situation. Thus higher productivity implies reduced cost per unit.

It was also mentioned that the impact of Productivity would be felt as a chain reaction: the lower prices would increase the purchasing power of money and generate higher demand for existing as well as new products: this would also lead to higher wages for workers and higher profits for the industry, which again helps in expanding or starting newer factories; this expansion creates all-round development and more employment and, in general, leads to higher level of living.

It, therefore, follows that the above results of the gains of productivity could only arise if the participants-labour, capital and management-are motivated to contribute their best not only to the individual unit but also to society (consumers) at large. Herein arises the importance of sharing the gains of productivity. If the gains are not spared equitably, the expected chain reaction may not set in and thus the expected results will not be achieved.

32. John Patton, President of John Patton Engendering Firm, as quoted in the book 'People and Productivity, by R. A. Smermeister, McGraw Hill Book Co.

The crux of the matter, namely, higher productivity and the consequent achievement of higher standard of living to the masses, therefore, rests on sharing the gains of productivity. This is a vital aspect, for if the participants do not appreciate and contribute to higher productivity, there will be nothing to share and no material progress could be achieved.

The Planning Commission³³ has summarised the situation aptly : "Neither the exercise of their organised strength in industrial conflicts nor laws and the intervention of the State can help the workers much in realising their aspirations. Their gains can arise only out of the strength and dynamism of the economy, the only enduring basis of which is a rising level of productivity. No increase in profits, which does not come out of improvements in productivity but has its origin in current scarcity and the stresses of development, can be regarded as a sign of prosperity. Management has given the lead by bringing about the maximum rationalisation in its own sphere and eliminating all unjustifiable practices which at present act as disincentives in drawing the best out of the workers. The vicious circle of poverty and unemployment and low productivity can be broken only by a tremendous stress on the maximum possible contribution being made by all the participants in the processes of production. For the workers no real advance in their standard of living is possible without a steady increase in productivity, because any increase in wages, generally, beyond certain narrow limits, would otherwise be nullified by a rise in prices."

The British Trade Union Representatives who visited U.S.A. to study productivity in American industries have stressed³⁴ :

- (i) British trade unions' interests can be harmed by the forcing of increases in pay unrelated to increases in output or productivity;
- (ii) a maximum of flexibility and mobility of labour is to be encouraged to meet demands on the British economy;
- (iii) training officials of the leading trade unions in production engineering is to be encouraged and extended;
- (iv) the economic implications of an increase in the standard of living should be brought home to trade unionists more;
- (v) they should not oppose technological advances, but should insist on full consultation before and during introduction of new techniques, methods, etc., and of adequate scales of pay for rearranged jobs.

33. Third Five Year Plan, Planning Commission, Govt. of India.

34. C. Hutton, op. cit., p. 153.

Though sharing the gains of productivity is such an important issue, there appears to be no universal rule or formula to help in the decision of equitably sharing the gains.³⁵ It appears that the solution may have to be worked out at the unit level, which implies that labour and management must come to agreement on this aspect, keeping in view not only their immediate interests but also the wider interests of society at large, of which both labour and management are a part. This again brings to the fore the importance of labour-management relations based on enlightened understanding of the situation.

After studying several aspects of the question, the National Productivity Council of India has come to the conclusion that adoption of the following guidelines as a basis of a productivity policy would go a long way in helping enterprises and unions to make a positive contribution to national economic growth consistent with their respective interests³⁵;

- (i) There is a need to develop a national approach to sharing the gains of productivity, which should be flexible, equitable to understand.
- (ii) While it is not easy to develop an overall national formula for sharing the gains of productivity, it should be possible to suggest broad guidelines, and illustrate 'models' or schemes for the purpose.
- (iii) Sharing the gains of productivity should be regarded more as a philosophy of Industrial Relations rather than a statistical technique of distributing the gains.
- (iv) The managements have the primary responsibility for increasing productivity. They also have the responsibility for motivating labour and seeking its cooperation for increasing productivity.
- (v) Comparatively few enterprises have adequate incentive schemes. Therefore, wherever possible, enterprises should be encouraged to induce effective incentive schemes for increasing productivity, including measurement thereof. However, it is not advisable to have a high powered body by an Act of Parliament for establishing productivity norms and other related standards. Production norms should be arrived at on the basis of scientific productivity techniques and these should be finally settled through mutual negotiations between managements and trade unions.
- (vi) Such incentive schemes should be simple but composite. These schemes must have an element of providing training to employees and motivating them to reduce wastes.

35. See Sharing the Gains of Productivity, National Productivity Council, 1967.

- (vii) Such incentive schemes should be evolved with effective participation of worker's representatives.
- (viii) Enterprises should be encouraged to introduce job evaluation systems for proper categorisation of workers.
- (ix) Enterprises should be encouraged to evolve productivity agreements with participation of worker's representatives. Such productivity agreements should keep in view the interest of the consumers also.
- (x) The gains of productivity through application of incentive schemes, productivity agreement, waste reduction and a host of other productivity techniques should be equitably shared between the management and the labour through mutual agreements. For this purpose, organised industries may be categorised on the basis of their wage level. Where the wage level is low, employees should be given a higher share in the gains of productivity.
- (xi) Schemes for sharing the gains of productivity should be tried in some of the organised manufacturing industries in the initial stages. "³⁶

36. Guidelines and Illustrative Models for Sharing the Gains of Productivity, National Productivity Council, 1962.

4. A Plan of Action

Salient Features

The first salient feature of productivity noted was that the results of increased productivity would be beneficial to an in term of increasing the standard of living of people. This brings to the fore that everyone employed in gainful employment should contribute to increased productivity to help him self and build a strong nation. In this context, productivity interpreted as an attitude of mind assumes great significance.

Higher productivity is not just increased production, which is merely producing more by using more resources, which will not help in the economic development; on the other hand, productivity, which is efficient use of resources, contributes to rapid economic growth.

It was observed that every economic activity in every sector of the economy had productivity aspect associated with it-technological, economic and managerial including human aspects.

Studies made towards interpreting the productivity change at the macro-level pointed the 'technical change' or 'technical progress' as a major contributing factor; the term 'technical change' was used in a broad sense which included economies of scale, changes in the efficiency of resources allocation, improvements in quality, technological improvements, improved managerial efficiency and the like.

These studies also indicated that there was no significant relationship between mere accumulation of capital and economic growth.

Studies at interpreting 'Technical Change' in a penetrating manner have indicated that Education and Research (better educated labour force and Advancement of knowledge) matter a lot in contributing to economic growth and prosperity.

Studies at the micro-level indicate that improved techniques of production either due to technological change or managerial efficiency play a large part in increasing productivity.

The micro-studies have also pointed out that even without any major investment; it is possible to raise the efficiency of existing plants.

Productivity techniques-techniques which do not require heavy capital investment, but help in the effective utilisation of a given set of resources-play a major role in increasing productivity at the plant level.

Standardization plays a vital role in a developing economy in hastening economic development.

Experience and studies suggest that in the ultimate analysis productivity approaches and techniques can bear fruitful results of lasting value in an atmosphere of good human relations in general and particularly good labour-management relations at the unit level. An 'enlightened' understanding on the part of people in general and particularly labour and management appears to be an essential ingredient in achieving higher productivity.

The gains of productivity should be shared equitably amongst the participants -labour, capital, management and society at large. Government also stands to gain through higher productivity through tax revenue; it has also responsibility for framing policies and procedures for economic development so that there is stimulation for achieving higher rate of economic growth.

Basis for a Plan of Action

The salient features with regard to productivity presented in the previous section, appear to suggest the following plan of action as a feasible proposal. Some of the ideas may be long-range in character but it appears reasonable to start all the ideas as early as possible and simultaneously, wherever possible.

Productivity as an attitude of mind has been emphasised. The Anglo-American teams which visited the USA have said.³¹ "It is said that American Trade Unions and management, customers and producers, politicians and professional men-men and women, old and the young-are more productivity-minded than Europeans."

The implication of productivity as a phenomenon benefiting all individuals has been mentioned; this implies that every individual in a society would be benefited and since benefits do not accrue without corresponding' sacrifice, individuals in a society must contribute towards productivity achievement. This brings to the fore the need for a movement in a society, production movement. The idea of movement

31. Hutton. op. cit, p. 182.

as envisaged here signifies mass participation towards achieving a common goal. The idea of a movement may not be new at least to the people of India. The 'Swadeshi Movement' or the movement for political independence brings back to memory the glorious contribution of popular awakening to the success of the movement. Again, another movement is called for this time to achieve economic independence or higher living standards for masses.

A movement signifies the effective participation of all in a community towards a common goal; the movement achieves success only with the attainment of this goal. In the process of this achievement various phases have to be gone through and the time required for final achievement depends upon the awareness and participation of all concerned.

The phases in the process of achievement of the goal may be visualised as follows: Firstly, the need for a movement. In order to create movement, there must be a worthwhile cause, it must be a common cause and affect or concern all the community. It is only then one could expect participation from all which form the foundation on which success could be achieved. The implication of productivity in terms of higher standards of living is certainly of fundamental value to a community and a cause worthwhile for everyone to contribute. Thus, one could think of the productivity movement as a constant and continuous endeavour to do things in a better way for the benefit of the community as a whole and, therefore, a movement is certainly called for. After this acceptance of the need for a productivity movement, it may be useful to view this movement as a process with several phases until it reaches its goal of creating an attitude of mind in everyone for constant and continuous improvement.

The various phases in the process of reaching the ultimate object of the productivity movement are:

- (i) awareness of the meaning and implication of productivity by all in the community and particularly management, workers, trade union members and others who are engaged in any economic activity.
- (ij) application of productivity techniques at the unit level including Government, public utilities, hospitals for increasing productivity, with measures and procedures for sharing the gains of productivity.
- (iii) Continuous evaluation of practices and results achieved for possible modification, development of new technique and procedures to achieve the stated objectives of the productivity movement.

The three phases presented above are of vital importance in a productivity movement in the sense the movement may not be successful if anyone of the phases is not carried out; the clear enunciation of these phases is done to emphasise the components of the productivity movement. In these phases are included, the technological and managerial talent and its application with the understanding of the social and cultural patterns of the community. It is also to be appreciated that these three phases are not independent of each other and capable of implementation simultaneously probably under ideal conditions. However, it is reasonable to visualise the productivity movement as a complex process with the three phases mentioned coming into focus at the appropriate time.

Education as well as research as major contributory factors in economic growth has been brought out emphatically. Where illiteracy is high, understanding and common sense will be poor and the masses would be swayed by emotional feelings rather than reason; necessary skill and efficiency would be poor. It is, therefore, necessary to have an extensive education programme to make an individual a useful citizen and a contributor to growth. Through proper education and training proper attitudes could be created.

With higher standards of education, research also flourisher and this brings advances in knowledge and contributes to progress and prosperity.

Productivity at the unit level assumes great significance as this is the starting point in the application of productivity ideas. At the unit level, productivity techniques and efficient managerial practices should find increased application. It is, therefore, necessary to propagate the understanding of the productivity techniques to the point of applicability at each unit. Successful application of productivity techniques and management practices should be documented and made available for wide dissemination. Productivity literature made available to all concerned would go a long way in the propagation and application of these techniques.

The basic idea in the propagation and application of techniques which may be treated as a part of the productivity movement is not merely the application of a set of techniques but development of an attitude of mind for constant improvement in every sphere of economic activity. This step could get through results and practical demonstration of benefits and may provide the motivation for participation of all concerned for further improvements. Benefits in terms of reduced prices, better products, equitable sharing which should result, can bring the required participation. This step could be taken in individual plants, offices and other work centers and depends on the leadership of persons in the superiority and managerial positions. The cumulative effect of all these enlightened activities

will pave the way for reaching the ultimate objective of the productivity movement. In this process of gradual development all groups of people-managers, workers, farmers, consumers, producers, trade union personnel, researchers, educationists get the required motivation for participation through voluntary understanding as well as benefits which are likely to accrue.

Evaluation of individual units and organisations should become a key function; that is scientific evaluation of activities should be undertaken as a routine feature in individual units and organisations including those concerned with public services. Judging performance by the results achieved in relation to objectives as a criterion of efficiency of individuals and organisations should become a regular feature in all spheres of economic activity. This ensures progress through participation and application of effort by individuals.

Ways and means must be devised to secure harmonious labour-management relations on a continuing basis; mutual understanding of the problems and equitable sharing of gains would surely contribute to the success of good labour management relations.

Finally, productivity should find more prominent place in our national planning. Now that extensive infrastructure for growth has been laid, the importance of productivity and productivity services in the field with requisite depth and seriousness is all the more vital with reference to the wide variety of economic activities generated in all sectors of the economy. Productivity policies should be developed with reference to economic activities which will hasten the economic growth by utilisation of available resources including technology more effectively. Productivity policies should set the pace for proper and constant evaluation and consolidation of experience; and a productivity plan should be woven into the plan of economic development. It is also necessary to think in terms of fiscal and other incentives to industries and agriculture which will induce to improve their productivity performance.

Conclusion

A basis for a plan of action for the development of economic growth through higher productivity in our country has been suggested, highlighting the areas where effort should be made. In India, spearheading of the productivity movement has been taken up by the National Productivity Council (NPC). With its headquarters at New Delhi, the National Productivity Council, established by the Government of India in 1958 on the [LO pattern with representatives of the Government, Employers and Workers has eleven Regional Directorates located at the principal

industrial centers Ahmedabad, Bangalore, Bombay, Calcutta, Chandigarh, Delhi, Kanpur, Bhopal, Gauhati, Patna and Madras. There is also a network of 48 Local Productivity Councils organised on the same ILO pattern and working autonomously, but intimately with NPC. This organisational set-up is the main instrument that brought about significant improvements, at the plant level and contributed to the through which they have growth of industrial productivity.

In addition to the activities of NPC, there are many other institutions, organisations, research bodies and associations who are contributing to the productivity movements in their own specialised areas. It is hoped that the efforts of all concerned will quicken the economic growth and achieve the end-result of continuous higher standards of living for all and achieve the goal of “ Prosperity Through Productivity”.