Chapter - VIII

SUMMARY AND CONCLUSIONS
Chapter VIII

SUMMARY AND CONCLUSIONS

Any technical change introduces a shift in the production frontier due to changes in relative efficiency, economies of scale, increased capital intensity, and ease of substitution between factors. The increased efficiency and economies of scale can lead to higher output without introducing either labour saving or capital saving devices. It may be understood that increased capital intensity, which is another component of technological change need not increase output ipso-facto for a given level of inputs. Similarly, factor substitution may be either labour saving or capital saving depending on which factor is relatively more scarce.

Technological progress that manifests itself in the increased overall efficiency and returns to scale may or may not involve a change in capital intensity measured in terms of the amount of capital required to employ one unit of labour. If technical progress involves increase in capital intensity then more capital will be required to employ one person. This implies that such a technical change should take place only when growth in capital exceeds the growth in labour and, capital is cheaper than labour. However if growth in labour exceeds the growth in capital then increases in capital intensity involves a higher level of unemployment and underemployment. Therefore, the two planning objectives of maximizing immediate employment and income may be in conflict.
This conflict can be however resolved to a smaller or greater degree, depending on the ease with which factors can be substituted for each other (elasticity of substitution). This fourth component of technological change measures the ease of substitution between labour and capital. If factors can be easily substituted for each other then it will lead to intensive use of faster growing factor and thereby better utilization of abundant resource in the economy. Therefore, the elasticity of substitution becomes a crucial economic parameter, having important policy implication for economic growth, international trade, relative distribution of income and resource allocation. If substitution between capital and labour is easy then high employment and high output can be achieved simultaneously. Factor substitution will be capital saving if growth in labour is higher than growth in capital and labour saving if growth in labour does not exceed that of capital.

The technological change should be in conformity with the resource endowments of the economy and then only it will accelerate the pace of economic growth. Considering the general character and the resource endowments of the Indian economy, the desirable direction of technological change appears to be on the lines that the efficiency of the input use, returns to scale and factor substitution should increase but capital intensity should not. High capital intensity
implies that factor substitution is not easy. Therefore capital intensity increases in the Indian economy will not be consistent with its resource endowments. Further, labour being relatively faster growing factor as compared to capital the desired technical change should be labour using and capital saving. The production structure should be flexible enough so that it is easy to substitute labour for capital. Such a technological progress will lead to steady growth in output and employment on a continuous basis. India should go for those techniques of production which are labour-using and capital saving. Such techniques mean fuller utilization of the abundant factor, labour. Fuller utilization of labour input will lead to higher employment, higher incomes, higher output and higher demand for goods and services.

Summary of Main Results

Although technical progress cannot be measured precisely but its broad trends may be traced by analysing the factor use pattern in the Indian industries. The overall results demonstrates considerable diversity in the experience of different industries. The growth in output of industries like Electric Fans, Electric Lamps, Iron and Steel, Chemicals, Paper and Paper board, Confectionary etc. has been quite high and sustained. Whereas the industries like Cotton Textiles, Sugar, Jute Textiles, Cement etc. have been having quite low growth in output. The movements in employment have been quite similar.
to the movements in output in various industries. The movements in labour productivity and capital productivity are also quite diverse. Labour productivity has increased significantly in industries like vegetable Oil, Chemicals, Tanning, Glass and Glass wares etc. and insignificantly in Matches, Iron & Steel, Cement etc. However capital productivity has not increased appreciably in most industries; rather the trend is on decline in most industries. The movements in labour costs and capital costs show inverse relationship. These simple indicators underline that technology and process of technological progress in Indian industries are quite varied and diverse. Improvements in productivity have not led to improvements in wage rates or reduction in prices but improvements in rates of surpluses to the owners of capital.

Efficiency in Indian Industries

Studies on Indian manufacturing sector as a whole show that overall efficiency of industrial sector has been declining. This is quite disturbing as it may seriously impair the process of industrialization. However, an examination of the performance of individual industry is necessary for a better understanding of the phenomenon as well as for delineating the area of remedial action. The detailed analysis showed that the performance of some of the industries, mainly the one which have diversified product range like Bicycle Glass and
Glass-ware, Electric Fans, etc., have been fairly satisfactory, whereas in the traditional industries like Cotton Textiles, Jute Textiles, Matches and Sugar the overall efficiency has declined.

Returns to Scale in Indian Industries

Studies on returns to scale for the Indian industries provide extensive evidence on existence of economies of scale for many industries in India up to late fifties. The studies covering the period thereafter show that the scope for economies of scale in Indian industries is limited. Rather most industries exhibit constant returns to scale. The only redeeming feature is that diseconomies of scale has not set in.

Capital Intensity in Indian Industries

In Sugar, Chemicals, Cotton Textiles, and Iron and Steel industries increases in capital per person is quite significant whereas capital per person has declined in Confectionary, Fruits and Vegetable processing, Electric Fans and Electric Lamps, etc. In Paints and Varnishes, Plywood, Bicycles and Sewing Machines it remained almost constant. The more important question relating to capital intensity is to find out how much of increases in labour productivity is due to this phenomenon. Capital intensity is able to explain the growth in labour productivity in Sugar, Tanning,
Ceramics, Cotton Textiles, Confectionary and Sewing Machines.
In other industries despite a rise in capital per person it has not led to gains in labour productivity. This implies that growth in labour productivity in many industries is not due to capital intensity and therefore the argument that capital intensity increases the labour productivity is not tenable generally. The capital deepening in Indian industries is unwarranted. The raison detri of capital deepening in many industries is questionable.

**Factor Substitution in Indian Industries**

The substitution of labour for capital could be either due to the effect of factor prices or due to labour-using technological change. However, if capital is being substituted for labour, that may be again be due to the effect of factor prices or due to a capital-using technological change. Factor substitution shows that how much capital (or labour) is required to replace labour (or capital) so that same output level can be maintained.

In many Indian industries where labour productivity has increased the labour costs have declined and capital costs have increased. In those Indian industries where labour productivity did not rise, labour costs increased and capital costs has declined. There is also a negative correlation between inter-industry movements of labour costs and capital
costs, which suggests that the largest increases in labour productivity are accompanied by largest increases in capital costs, indicating factor substitution. The changes in relative factor prices, which initiates factor substitution, is found in all industries, therefore the inter-industry variations in labour productivity may be because of variations in the ease of substitution between capital labour. Analysis of Indian data showed that labour productivity and capital costs increased significantly in consumer goods industry like Vegetable Oil, Rice Milling, Woollen Textiles etc. therefore in these industries capital has been substituted for labour, whereas labour productivity and capital costs declined in Matches, Bicycles, Sewing Machines etc. therefore substitution may be reverse. There are inter-industry differences with respect to ease of capital-labour substitution, which may primarily explain the inter-industry growth differentials.

The elasticity of substitution is found to be significantly different from zero and one in many industries. In most cases the elasticity of substitution is low. Low elasticity of substitution means that quantity of capital (labour) has to be substituted for replacing labour (capital) for same level of output. Obviously the production structure is inflexible and it has resulted into capital deepening. The evidence of absence of technical change in most cases and negative one in some cases can be clearly visualised in some cases. Traditional industries like Cotton textile, Jute
Textile Sugar etc. have been working with 20 to 30 years old machinery which has become obsolete, old and worn out.

These results are not surprising because process and strategies adopted for industrialization during this period was such that it should lead only to a capital intensive technology. During 1951 to 1963 policy of import substitution was followed in investment, consumer and intermediate goods. However policy of intermediate import substitution resulted in highly capital intensive industrial structure. Between 1957-1965 number of foreign technical collaborations approved by government is revealing. Foreign technical collaboration approved by government included Sugar industry, Cotton Textiles, Jute textiles, Electrical machinery, Cement, Paper and paper products. It has been found that the firms which have contracted technical collaboration agreements are capital intensive with high labour productivity, low capital productivity and low overall efficiency. The Indian industries have imported a lot of know-how which is normally capital intensive. The policy instruments used for industrialization consisted of industrial licensing system and price and distributional controls. Domestic production was also protected from foreign


competition. This led to a protected market which ensured profitability even with rising costs and low productivity. In such a situation growth in output is possible only with increased inputs.

The policy of import controls and industrial licensing policies restricted competition. Therefore inefficient firms could continue to exist and even imported technology was found to be inefficient. The foreign firms have been able to put up plants which are obsolete and unsuited to Indian conditions.

The control mechanism operated was such that "improvements in productivity, arising from greater efficiency, would not be illegitimated by the authorities".

To sum up, the study shows that the rate of technological change in the growth process of Indian Industries is not very significant. The only component of technological change which seems to have affected growth process are capital intensity and factor substitution. In fact, changes in output have been accompanied by parallel changes in the employment implying, thereby, that major source of output growth in Indian industries is the labour input. The correlation between movements of output and employment is positive and highly significant.

The one fact that clearly emerges from the analysis is that in an overall sense technological progress, unlike in

developed countries, has not been a contributory factor in the Indian industrial growth. The finding that overall efficiency in factor use in the Indian industrial sector has declined, is disquieting. The inter-industry variations in efficiency parameters thus reflect on the pattern of industrial policy pursued in India. For example the new product line not subjected to artificial ceiling with regard to the technological progress have come out favourably on efficiency considerations. Whereas in the traditional industries like Sugar, Cotton Textiles and Jute Textiles where modernisation and innovation have been possible only under constraints, the policy options are that incremental output can be obtained either by somewhat wasteful use of resources or policies are revised to enable upward shift in technological frontiers.