CHAPTER - VI

SUMMARY AND CONCLUSIONS

In the process of economic development, developing economies understood the dynamic role of the industrial sector and impact on economic growth and development. The development depends upon increase in quantitative physical inputs and more so on the qualitative improvements like efficient factor allocation, productivity growth, technological upgradation, capacity utilisation etc. This study on productivity growth and technological change in the manufacturing sector of the Indian economy shows that TFPG and technical progress has been rather low over the sample period from 1973-74 to 1992-93. The measurement of productivity growth and technological change needs a special attention. It raises following questions; what special features do they have that make it different from physical goods, like machines that embody technological knowledge ? How do the organisation of firms, market structure and government policy interact to effect the use of technology and the productivity growth ? And how does that process affect economic growth ? The rates of growth in productivity vary across industries for a number of reasons which are industry specific. Internally, there could be changes either in labour or capital productivity. This could be caused by a significant change in labour quality or changes in capital structure and intensity. The external factors could be the application of superior technology, variations in the relative price of inputs, etc.

Indian economic and industrial growth rates have lagged behind many other Asian countries. A significant reason for this has been the failure of India's industrial structure and its domestic and trade policies to give importance to the productivity growth and the suitable technological upgradation. An analysis of developed countries and their technological and productivity growth show how effectively these factors have contributed to the economic growth and development of nations. In advanced countries, people on average work less hard and enjoy greater quantities of consumption as well as larger variety of goods. Clearly, much of this has been made possible by the invention of new and more efficient technologies.

The broad objectives of industrial development in India have been formulated on the Industrial Policy Resolutions of 1948 and 1956. The objectives include increasing overall production and productivity, encouraging small scale industries with a view to generating more employment, bringing regional balanced industrial development, preventing concentration of economic power by MRTP Act, protection of domestic industries etc. How far these objectives are realised during planning period ? In the process of industrial development public sector played an important role by providing infrastructure and by establishing basic industries The leadership role was played by public sector while the private sector played a complementary role. As a result, the industrial base of the economy has widened, huge investments were made and the share of industry in the economy has increased.

In the process of industrialisation four distinct periods can be noticed. The first period '1950-65' resulted in marked structural changes in the system and public sector

played dominant role during this period. During the second period '1966-84' the emphasis on state ownership and control of strategic parts of Indian industries gradually declined. The third period '1985-91' is characterised by various policies leading to liberalisation of private sector and decontrol on private sector. The fourth period starts from 1991 with new economic policy for stabilising the growth and structural adjustment of the economy.

Indian economy achieved diversified structure of industrial base over this period. At the time of independence, industrial output contributed to only 6.6 per cent of National Income. At that time Textiles, Jute and other Handicrafts industries dominated scene. The Second Five Year plan gave priority to rapid industrialisation with particular emphasis on the basic and heavy industries. Subsequently capital goods industries like Machinery, Capital Equipment, Iron and Steel, Heavy Chemicals etc. started emerging during the first phase of industrial development.

The second period is characterised by industrial recession. Most of seventies faced with low industrial growth and development. The oil prices hike put further check in the growth of this sector. However, the partial liberalisation policy initiated in late seventies and early eighties bought the turnaround in the industrial growth. The capital goods and consumer durable goods sector grown faster during this period. To protect domestic industries and to restrict imports, the process of import substitution was introduced during planning period. Foreign competition was virtually eliminated. Industries were set up to cater to the domestic market even in areas where India had less comparative advantage. This policy ultimately resulted into high cost of production in the manufacturing sector.

However the process of industrial development has succeeded in widening the industrial base over the planning period.

The use based classification in terms of value added show the share of consumer goods declined from 50 per cent in the year 1960 to 36 per cent during the year 1990. At the same time, the share of intermediate goods and capital goods increased from 46 per cent in 1960 to 62 per cent in 1990. The diversification of the industrial base made possible the production of a very broad range of industrial products

The industry wise analysis show that in terms of value added, the relative share of textiles declined from 31.8 per cent in the year 1960-61 to 13.85 per cent by the year 1991-92. Most of consumer goods sector share remained almost constant and capital goods section showed increasing trend. Rubber, Plastic, Petroleum, Coal Products, Machinery, (Electrical and Non-electrical) showed improvement in shares over this period. In terms of employment, Cotton textiles (23) industry had a share of 19.14 per cent in the year 1973-74 which declined to 10.91 per cent by the year 1992-93. In case of Food and Food Products (20-21) and Beverages and Tobacco Products (22) employment proportion gradually increased over the period of study where as in other industries employment proportion compare to number of industries declined or improved marginally. The employment pattern in most of industries indicate that industries over a period of time became less of labour intensive and more of capital intensive

The performance in terms of value added also shows that the share of the Cotton Textiles (23) was 19.14 per cent in the year 1972-73 which declined significantly to 9.38 per cent by the year 1992-93. In term of value added Rubber, Petroleum Products

(30) and Chemical and Chemical Products (31) have improved its share over the study period. However out of 16 industries 9 industries showed a decline in their share in terms of value added over this period.

The overall picture shows that the manufacturing sector gained its importance in the field of economic development and the production pattern underwent a massive change and developed a bias infavour of capital goods. The industrial policies implemented during planning period led to capital intensive techniques of production without much improvements on the productivity front. This distinct aspect emerges from the analysis of the trends in capital output ratio, capital labour ratio and output-labour ratio. The analysis show that a sharp increase in capital intensity is accompanied by falling capital productivity and rising labour productivity. The steady rise in capital output ratio without proportionate growth in output can be considered as sign of inefficient use of factor inputs.

For most of the industries in the manufacturing sector K/L ratio increased more than 4 per cent per annum during the period of study. It is also seen that for almost all industrial categories, with the exception of Transport equipment (37) the growth of K/L ratio is higher than capital - value added ratio. It is observed that there is an increase in capital intensity and labour productivity in all industries. However, there is a divergence between these two ratios and that capital intensity rose higher than labour productivity. The important reasons for higher capital intensive growth rate is the rise in capital goods industries, rise in public sector investment and a rise in incremental capital output ratios. Application of larger doses of capital in the name of modernisation in most of the

industries can be an important element for strong capital intensive industrialisation. The rising gap between K/L ratio and labour productivity suggests that inefficient use of resources has become prominent feature of Indian industrialisation.

An exercise is conducted to identify the main factor which led to growing capital intensity in Indian manufacturing using decomposition analysis. The results show that the growing capital intensity is due to changes (rise) in K/O ratio itself. The rise in K/O ratio accounts for over 176 per cent of variations during the period of study Whereas the contribution through changes in value added is only around 10 per cent. It can be concluded that high rate of increase in K/O in Indian manufacturing industries is the outcome of rising K/O ratio itself across industries irrespective of their technological status.

The process of capital intensive industrialisation also led to increase in fuel intensity in this sector. For 'All manufacturing' sector the fuel intensity was 0.0510 in the year 1973-74 and it increased to 0.0619 by the year 1992-93. The raise is observed to be 20 per cent during the period of study. The study also observes that for 9 out of 16 industrial categories the fuel intensities have increased and only for 3 industries it has declined. Both capital and fuel are substituted in place of labour which ultimately leads to less employment opportunities for labour in this sector.

The performance and economic efficiency of a country can be measured in terms of improvement in productivity performances. The productivity growth has been accepted as a vital factor for the rapid development of an economy during the 20th century. Most of developing countries initially gave importance to capital accumulation. However, a

shift of labour and capital from less productive sectors can also accelerate growth through its productivity improvements. Therefore it is accepted by these countries that along with increases in factors of production, the productivity improvements can also contribute to the development of a country. The efficient processes enables economies save factor inputs and these can be utilised for the production in some other sector.

The partial and total productivity analysis conducted in this study show that the Indian manufacturing sector fetches benefits of productivity growth. The partial productivity growth measure is considered to be conventional and simple method of measuring productivity. Generally, labour and capital are used in partial productivity analysis. However these measures have limitation that if the inputs, labour and capital, do not vary in the same proportion, the relative share of the factors change and the analysis will show bias towards one particular factor. To overcome this difficulty TFPG is used to measure the productivity in the manufacturing sector.

In the partial productivity analysis the results show that labour productivity showed increasing trend and capital productivity displayed a declining trend. For 'All manufacturing' labour productivity has increased from Rs. 65.14 to Rs 121.56 from 1973-74 to 1992-93. The capital productivity for the sector in terms of value added per unit of capital declined from 0.4341 to 0.3379 over sample period It is surprising that the capital productivity for all individual groups at ASI two digit level classification declined. It is noticed Paper and Paper Products (29) faced a negative growth -6.34 per cent capital productivity which is the highest and the lowest fall of capital productivity observed is -0 19 per cent for Electrical and Non-electrical Machinery industry (35-36)

The estimates of partial productivities during 1973-74 to 1992-93 show that labour productivity grew at the average annual rate of 3.29 per cent and the capital productivity fell at -1.81 per cent during this time period. The rise in capital intensity at the average of 5 per cent per annum has been observed. It is observed that most of growth in labour productivity has been achieved through capital deepening.

The estimates of TFP are analysed through Kendrick and Solow indices in this study. The estimates of TFPG using Kendrick index show that there is a slight increase in productivity for the period of study. The index has increased from 100 in 1973-74 to 103.26 by the year 1992-93. However within manufacturing sector different industries exhibited different trend in TFPG. Rate of growth in the Index ranges from -2.09 per cent per annum in Paper and Paper products (28) to 2.82 per cent per annum in Textile products (26). It is noticed that six industries showed positive growth and 10 industries indicated negative growth in Kendrick index. However all manufacturing sector the growth rate was 0 39 and this growth rate is not statistically significant. This leads one to conclude that the TFPG using Kendrick's Index is not a major contributor to the performance of this sector

The Solow index of productivity growth also show an increase for the period of study. This index exhibits a trend growth of 0.41 per cent over the period which is considered to be low and statistically not significant. The study of individual industries show that out of 16 industries 13 industries have negative growth and only 3 industries have positive growth rate The study is also undertaken for two different sub-periods dividing 20 years into two sub-periods i e 1973-74 to 1982-83 and 1983-84 to 1992-93.

The estimates for sub-period reveal that there was improvement in TFPG for later period both in terms of Kendrick and Solow indices. The trend growth of Solow index has improved in later period. It was -0 96 in the first period which has gone to +0.90 for the second period. Among individual categories also 9 industries out of 16 for the second sub-period showed a positive trend in the Index. The Indian industrial sector exhibited high growth rates during the period of eighties and this is accompanied by improvement of TFPG

Kendrick and Solow indices of TFPG display a growth rates of +0.39 and +0.41 respectively. Eventhough these values are positive and can not be considered as significant contributor to development of the economy as they are close to zero and are not statistically significant. The finding of low growth in TFPG in the manufacturing sector is broadly in line with the earlier findings of different studies.

The growth of economy is very often constrained by the scarcity of certain crucial resources like capital and therefore, these resources should be utilised optimally through efficient allocation systems. The productive process should be so organised as to generate enough of surplus to make higher reinvestments in the future. For creating surpluses, better productivity performances are crucial for manufacturing sector. The concept of productivity is based on the assumption of a unique technological relationship between inputs and outputs. The production function approach can be applied to study the impact of technological progress and to estimate other parameters such as returns to scale, elasticity of substitution etc. A production function is a technical relationship between the inputs and output The measure of productivity and its sources lies in the concept of a

production function which refers to an efficient set of unique relationships between inputs and outputs. There are different forms of production function.

In this study CD production function and Translog production function are estimated. Most widely used production function in productivity studies is based on CD production function. However this function assumes unitary elasticity of substitution between factor inputs but in real situation it does not always remain unitary. To correct this, the translog production function which allows elasticity of substitution to vary is also fitted.

The results of CD production function show that most of Indian industries face decreasing returns to scale. The value is less than one for 10 out of 16 industries, which means that they are facing decreasing returns to scale and 4 are facing increasing returns to scale For 'all manufacturings' the returns to scale is 1.1159 and the sector is facing overall increasing returns to scale. However this value is not very high. The elasticity of output with respect to labour is 0.2770 which is significant at 5 per cent level and elasticity with respect to capital is 0.8389 which is significant at 1 per cent level.

The rate of technical progress for 'all manufacturing' is 0.0079, which indicates that the contribution of technical progress to productivity is very low. This means technical change has little impact on output growth of this sector. The value of technical progress is less than one per cent for as many as 10 industrial categories. For five industries, the coefficient representing rate of technical progress (λ) is negative, therefore, all them facing negative technical progress

In Translog production function $(1+\alpha_1)$ value gives the returns to scale It shows that 13 out of 16 industries are facing decreasing returns to scale and 3 of them are facing increasing returns to scale. For 'all manufacturing' sector $(1+\alpha_1)$ value is 0.9213 which is nearer one and the industry is facing almost constant returns to scale. However the coefficient is not statistically significant. With exception of three industries, most of Indian industries are facing decreasing returns of scale.

In this study the elasticity of substitution is found to vary from 0 9668 in the case of Textile products industry (26) to 1.4920 in Beverages and Tobacco product industry (22). The 'σ' value for 'all manufacturing' sector is 0.9012, however, for most of the individual industries elasticity of substitution value is found to be close to unity, indicating substitutability between labour and capital. Therefore it is possible to employ more labour without making much loss to the productivity The proper allocation of factors like labour and capital will improve the overall productivity of the economy.

The coefficient corresponding to time 'λ' value gives the rate of technical progress in the translog production function. The study shows that 5 out of 16 industrial categories the 'λ' value is negative. However most of other industries face positive technical progress. For 'all manufacturing' technical progress is accounted to be 0.0146 which is statistically significant Both CD and Translog production function show that the over all technical progress is positive but statistically it is not significant. Therefore one can not say with confidence that the technical progress will lead to increase in efficiency

Various results presented in the preceding paragraphs show that over a period of time Indian industry has become more broad based, the output growth has been significantly high, industrial dispersal has taken place. It is said that India has much wider industrial base even when compared to countries like Korea, Brazil etc. The government and its policies played an important role in widening the base. However less priority had been given to efficiency and profitability criteria. The public sector which accounts for 70 per cent of capital does not perform on pure efficiency criteria. The pricing of output of the public sector is based on social objectives. Due to high protection for the industries, the competition levels were low and even shortages persisted for a long time. These conditions also did not encourage technological upgradation. The old technologies are less efficient than the new technologies The new technologies are said to be more capital intensive but have higher TFP In addition, the newer technologies are largely developed in advanced industrial economies which are labour scarce and capital abundant. To adopt the new technologies to the local conditions, the local R&D should be well developed. But the expenditure on R & D is only 0.9 per cent of GNP which is considered to be very low. The experience of eighties show that with lower restrictions, the industrial performance has improved and that even TFPG has increased.

Through out the planning period Indian planners aimed at self sufficiency and followed import substitution policies India had occasions in the past to change its policy approach. In 1970's many countries took to export oriented growth but India refused to switch. During eighties more foreign capital borrowing was pursued with out making any

substantial change in the economic structure and policies. The foreign capital borrowed was debt rather than equity and was frittered away in low yield projects. This dependence on debt capital creating flows and low regard for efficiency gave comprehensive disadvantage to the crisis during early nineties. Since past 1991, the scenario of inflow is more in the form of equity capital which is determined by efficiency criteria as the equity funds flow to high yielding projects. If India pursued to new economic policy in the right earnest the results will be growth of output, employment and could lead to improvements in the standard of living.

By adopting an export oriented policy an economy produces with the intention of selling in the world market rather than concentrating in the local market. In case of India the local market itself is very large. The outward looking policy may lead to competitive out-look and would lead to greater emphasis on efficiency criteria. Even if one segment of the economy is highly efficient and is internationally competitive, it would have a cascading effect on rest of the economy. The efficiency criteria and competition would lead to upgradation of technologies and discard of inefficient technologies. The adoption of second technologies would give way to the best and innovations would persist.

The world-wide experience of the Post-World War II has clearly shown that the greatest beneficiaries of international division of labour are labour rich countries like Korea, Taiwan and Thailand and not capital rich economies. India has the competitive advantage in skilled as well as unskilled labour We have even greater advantage in artistic skills, which can make us to export high value of luxuries for which demand

around the world is elastic. In today's world the need for flexibility and adjustment is great. This argues for higher education, greater skill formation and continuing education of the Indian labour force which may work infavour India's comparative advantage. The protectionist policies would only hamper the growth of efficiency and would only favour the second best.

If production processes are to be efficient and competitive, controls will have to be eliminated. During the post 1991 era, a good number of measures have been taken. The reservation for small scale industries have also been reduced. One area which needs attention is the case of 'exit policy'. India does not have a proper exit policy. The 'no exit' situation has resulted in inefficient firms continuing in the market. A proper exit policy may be used for phasing out of old, inefficient technologies and would faster competitive forces. The exit policy may work as an instrument which may release some factor inputs and accordingly these factors can be reallocated towards efficient utilization. This will also help free entry and introduction of new technologies which will go a long way in improving industrial sectors performance. This measure alongwith other market oriented policies can make the manufacturing sector a better performance. Competition should be encouraged rather than discouraged by policy and attempts to at collusion and restrictive behaviour must be thwarted.

The steriotyped views about ability to compete internationally can only serve to keep us poor and backward. Therefore India has to be pro active and persue its goals in the international market under ever changing conditions The policies needs to be

rationalised to achieve the desired results. An industrial policy can not be formulated and function in isolation rather, it must be consistent with overall national objectives and goals which is supported by an institutional framework that will allow the realization of pre-set targets. Any policy adopted must comprise both domestic and international objectives of the country especially to promote the exports earnings of the nation in a liberalised setup. A comprehensive policy should domestically promote employment, efficient utilisation of resources, relative price stability, improvement of productivity, technological innovation, etc. In the external front industrial strategy must induce the competitiveness, encourage inflow of foreign investment and expansion of foreign market.