CHAPTER—6
CONCLUSIONS AND SUGGESTIONS

Productivity growth is essential not only to increase output, but also to improve the competitiveness of an industry both in the domestic and international markets. The growth of an economy is governed by two distinct sources of growth that is, input–driven and productivity–driven. The input–driven growth is achieved through the increase in factors of production which is certainly subjected to diminishing returns and is not sustainable in the long run. The productivity-driven growth is the growth in output that cannot be explained by the growth in total inputs. It is normally credited to the improvement in knowledge, organizational structure, human resources management, skills attainment, information technology and efficient use of factors of production. In the above context present study is one step forward in finding the effect of liberalization policies and technological change in Indian manufacturing industry.

The main findings of the study are summarized below:

- Positive Total Factor Productivity change in the period-I was explained in terms of positive Technical Change as compared to Efficiency change which was either negative or very low. The average Efficiency Change was 0.977. This showed a efficiency regress at the rate of over 2 percent per year. On the other hand the average Technical Change and Total Factor Productivity Change registered noticeable 9.3 percent and 6.7 percent change per year. This indicated that Total Factor Productivity change in this phase was explained by Technical Change Factors.
In period-II most of the reform measures were introduced due to which we found Total Factor Productivity change in most of the years was positive and this change was also very large in some of the years. The reason for positive Total Factor Productivity change was remarkable increase in Technical Change observed in most of the years, although Efficiency change was negative in the same period. The average Efficiency Change was 0.977. This showed a efficiency regress at the rate of over 2 percent per year. However average Technical Change and Total Factor Productivity change registered 6.9 percent and 4.5 percent change per year. This indicated that improvement in Total Factor Productivity change in this phase was explained by Technical change factors.

In period-III Total Factor Productivity change was positive for most of the years except in 2002 and 2007 in which we observed a regress in Total Factor Productivity change, due to a regress in Technical Change. In 2006 highest Total Factor Productivity growth of 76.2 per cent has been observed. The positive change in Total Factor Productivity was explained in terms of both Technical Change and Efficiency change, in some years contribution of Technical Change was greater in Total Factor Productivity as compared to Efficiency change. The average Efficiency was 1.009. This showed marginal improvement in Efficiency Change per year. On the other hand average Technical Change and Total Factor Productivity Change registered 6.6 percent and 7.6 percent increase in Technical Change and Total Factor Productivity Change per year. This indicates that the growth in productivity in this phase was explained by Technical Change Factors.

In most of the years of study i.e, 1980-81 to 2009-10 Total Factor Productivity change was positive except in some cases regress in Total Factor Productivity change has been observed. In overall study period this positive Total Factor
Productivity change was explained more by Technical Change as compared to Efficiency change. If we compare the Total Factor Productivity change of Manufacturing sector in pre-reform and post reform period, Total Factor Productivity change was positive in most of the pre-reform years, but Total Factor Productivity change was negative for three years in the same period. The contribution of Technical Change in Total Factor Productivity change was greater as compared to Efficiency change in the pre-reform phase which was started from 1980-81. In post-reform period which was started from 1991-92 Total Factor Productivity change was positive, this positive change was explained both in terms of Technical change and Efficiency change, but the contribution of Efficiency change was greater as compared to Technical change. The average Efficiency change in overall study period registered 2 percent increase per year. While the average Technical Change was 1.023, it showed 2.3 percent improvement in Technical Change per year. Average Total Factor Productivity change was 1.025. This indicated improvement of 2.5 percent in Total Factor Productivity change per year. This indicated that growth in this phase was due to Technical change factors.

**Findings on performance and determinants of Total Factor Productivity change in Indian Manufacturing Industry Subgroups:**

- The Compound Annual Growth Rate of Gross Value Added and labour were used as an indicator of industrial performance in overall study period. In *Food product* industry Compound Annual Growth Rate of Gross Value Added and labour was 7 percent and 11 percent respectively. If we compare the Compound Annual Growth Rate of both labour and Gross Value Added in pre and post reform
period, we observed decrease in Compound Annual Growth Rate of labour and Gross Value Added in post reform period. We observed decrease in Compound Annual Growth Rate of Labour and Gross Value Added in period III\textsuperscript{rd}, but Compound Annual Growth Rate of Labour was negative in this period.

- In **Cotton Textiles** industry the Compound Annual Growth Rate of Gross Value Added and labour was 5.2 percent and 14.6 percent respectively in overall study period. If we compare pre and post reform period, we observed increment in Compound Annual Growth Rate of labour, on the other hand Compound Annual Growth Rate of Gross Value Added registered negative growth in period II\textsuperscript{nd}, but both indicators registered positive growth in period III\textsuperscript{rd}.

- In **Wood & wood product** industry we found Compound Annual Growth Rate of 1.8 percent and 10.1 percent of Gross Value Added and labour respectively. After the comparison of pre and post reform performance we observed decrement in Compound Annual Growth Rate of Gross Value Added in post reform period. On the other hand Compound Annual Growth Rate of labour in post reform period registered improvement, this improvement in Compound Annual Growth Rate was greater in period II\textsuperscript{nd} in comparison to period III\textsuperscript{rd}.

- In **Paper and allied** industry Compound Annual Growth Rate of Gross Value Added and labour registered 2.9 percent and 12.3 percent respectively in overall study period. In the comparison of pre and post reform period, we observed increment in Compound Annual Growth Rate of both Gross Value Added and labour in period II\textsuperscript{nd}, in III\textsuperscript{rd} period Compound Annual Growth Rate of both
labour and Gross Value Added registered decrement, but CAGR of Gross Value Added registered negative growth.

➢ In *Leather and related* industry we observed 5 percent and 7 percent CAGR of Gross Value Added and labour in overall study period. In comparison to pre and post reform period, we found decrease in Compound Annual Growth Rate of both labour and Gross Value Added in period II\textsuperscript{nd}, but in period III\textsuperscript{rd} Compound Annual Growth Rate of labour registered 14 percent growth, on the other hand Compound Annual Growth Rate of Gross Value Added registered 3.1 percent growth.

➢ *Rubber & Related Products Industry* registered 0.9 and 9.3 percent Compound Annual Growth Rate of Gross Value Added and labour in overall study period. In comparison of pre and post reform performance we found deceleration in Compound Annual Growth Rate of Gross Value Added in period II\textsuperscript{nd} and III\textsuperscript{rd}. Compound Annual Growth Rate of labour registered increment in both II\textsuperscript{nd} and III\textsuperscript{rd} period

➢ *Chemical and chemical products* industry registered 6.4 percent and 18.5 percent Compound Annual Growth Rate of Gross Value Added and labour in overall study period. After the comparison of pre and post reform period, we found increment in Compound Annual Growth Rate of both Gross Value Added and labour in period II\textsuperscript{nd}, but in period III\textsuperscript{rd} negative Compound Annual Growth Rate of both labour and Gross Value Added has been observed.
In Non-metallic mineral products we observed Compound Annual Growth Rate of 5.3 percent and 14.1 percent in Gross Value Added and labour respectively. If we compare the pre and post reform period, we observed negative Compound Annual Growth Rate of Gross Value Added in period II\textsuperscript{nd}, but in period III\textsuperscript{rd} 9.9 percent Compound Annual Growth Rate of Gross Value Added has been observed. In case of labour 26.8 percent and 6.8 percent Compound Annual Growth Rate has been observed in period II\textsuperscript{nd} and III\textsuperscript{rd} respectively.

Basic metal and related industry registered 5.1 percent and 14.6 percent Compound Annual Growth Rate of Gross Value Added and labour has been observed in overall study period. In the comparison of pre and post reform period negative Compound Annual Growth Rate of Gross Value Added has been observed in period II\textsuperscript{nd}. In period III\textsuperscript{rd} 21.6 percent Compound Annual Growth Rate of Gross Value Added has been observed. In case of labour we observed higher Compound Annual Growth Rate of 31.3 percent and 8.8 percent in period II\textsuperscript{nd} and III\textsuperscript{rd} respectively.

In Machinery and machine tool industry we found negative Compound Annual Growth Rate of Gross Value Added in overall study period, but Compound Annual Growth Rate of labour registered 10.9 percent growth in the same period. In comparison to pre and post reform period, we found decrement in Compound Annual Growth Rate of Gross Value Added in post reform period. On the other hand Compound Annual Growth Rate of labour registered 25.6 percent and 10 percent growth in post reform period.
In the *Transport equipment* industry we observed negative Compound Annual Growth Rate of Gross Value Added in overall study period, but in case of labour 7 percent Compound Annual Growth Rate has been observed. In comparison to pre and post reform period, we observed negative Compound Annual Growth Rate of Gross Value Added in period II\textsuperscript{nd}, but in period III\textsuperscript{rd} 6.1 percent Compound Annual Growth Rate has been observed. If we see the Compound Annual Growth Rate of labour it registered 19.7 percent growth in period II\textsuperscript{nd} and 4.1 percent growth in period III\textsuperscript{rd}, it was an improvement over period I\textsuperscript{st}. In period I\textsuperscript{st} Compound Annual Growth Rate of labour registered negative growth.

We found 2.5 percent Compound Annual Growth Rate of Gross Value Added in *Other manufacturing* industry, on the other hand Compound Annual Growth Rate of labour registered negative growth in the study period. If we compare the pre and post reform period negative Compound Annual Growth Rate of Gross Value Added has been observed in period II\textsuperscript{nd}, but in period III\textsuperscript{rd} 1.2 percent Compound Annual Growth Rate of Gross Value Added has been observed. In case of labour only III\textsuperscript{rd} period registered 8.8 percent Compound Annual Growth Rate in comparison to other periods in which it was negative.

In *period-I* all manufacturing industries experienced positive Total Factor Productivity change. The industries having highest Total Factor Productivity change were wood, wood product and non-metallic industry, they registered 12.7 per cent and 10.7 per cent Total Factor Productivity growth respectively. The lowest Total Factor Productivity growth of 4.2 per cent has been experienced by machinery, machine tools industries due to a regress in Efficiency change. The
positive Total Factor Productivity change in majority of the industries was explained in terms of remarkable increase in Technical change as compared to Efficiency change which was negative for all except in case of non-metallic industry.

➢ In period-II we found positive Total Factor Productivity change for all industries except for food product industry which registered a regress in Total Factor Productivity change. Non metallic industry with 9.3 per cent Total Factor Productivity growth was the highest performer in this period. The positive Total Factor Productivity change in most of the industries in this phase was explained by the majority contribution of Technical change as compared to Efficiency change which was negative for all industries except in case of cotton textiles and rubber industries.

➢ In period-III Total Factor Productivity change registered positive growth in all manufacturing industry subgroups except in cotton textile industry which experienced a regress in Total Factor Productivity change. Other manufacturing and machinery and machine tools industry registered highest Total Factor Productivity growth of 19.6 per cent and 10.6 per cent respectively. The positive Total Factor Productivity change in majority of industries was explained in terms of Technical change as compared to Efficiency change. Contribution of Efficiency change in Total Factor Productivity change was low as compared to Technical change.

In sum, in comparison of productivity growth during three sub periods it was revealed that Total Factor Productivity growth in Indian manufacturing sector has fallen
from 6.7 percent per annum during pre reform period to 4.7 percent per annum during the first phase of post-reform period, Total Factor Productivity growth registered 7.6 per cent increase per annum only in the second phase of post reform period which was marginally better than the pre-reform growth of Total Factor Productivity growth. Hence at aggregated levels impact of economic reforms was not in a desired direction as envisaged by the policy planners of India.

In the manufacturing industry subgroup out of 12 Manufacturing Industries six industries were showing positive Total factor productivity change and another six industries were showing a regress in Total Factor Productivity change throughout the study period i.e,1980-81 to 2009-10. The lowest performers were food product and cotton textile industry, this low performance can be explained in terms of Technical change, since this was negative throughout the period, Efficiency change was positive but this positive change was waved off by negative change in Technical change and it resulted into negative Total Factor Productivity change. The highest performers were other manufacturing and transport equipment industry, these industries registered 14 per cent and 12.8 per cent average Total Factor Productivity change respectively. If we compare the manufacturing industries having positive Total Factor Productivity change and those who were having negative Total Factor Productivity change, we found in low performers with negative Total Factor Productivity change the reason was a regress in Technical change because Efficiency change was positive in most of the industries. Manufacturing industries having positive Total Factor Productivity change showed both Efficiency change and Technical change was positive, but the higher proportion of Total Factor
Productivity change was explained by Technical change as compared to Efficiency change.

**Findings of Multiple regression analyses:**

- The panel data regression analysis showed that out of four explanatory variables import intensity was the only variable which positively effect the Total Factor Productivity and Technical change in Indian manufacturing industry in the study period. Except import intensity no other variable effect determinants of productivity positively, but their negative effect was also not significant.

- In *period I* import intensity was the only variable which positively contribute in Total Factor Productivity and Technical change in Indian manufacturing industry, but its contribution was not significant. Other explanatory variables effect determinants of productivity negatively, but were not found statistically significant.

- In *period II* import intensity and REER positively contribute in the productivity of Indian manufacturing industry. The contribution of REER was also significant as compared to other variables.

- In *period III* import intensity, FDI and REER positively effect the productivity in Indian manufacturing industry. However the contribution of REER was found significant in this period. Contributions of other explanatory variables in determinants of productivity of manufacturing industry were not found significant.
Suggestions:

As per our findings which we have discussed in the previous section, we found import intensity is the only variable which significantly affects productivity and its components in the Indian manufacturing sector. By this we can say that competition is the only way to improve the productive performance of Indian manufacturing sector, for this we have suggested some of the policy measures in this section. We believe application of these measures would certainly improve the productive performance of Indian manufacturing industries.

a) Rigidities in labor laws acting as an impediment in efficiently building of large firms, reviewing labour laws and labour market regulations facilitate the growth of labour intensive industries which developing country like India needed most. Government should retain the Contract Labour (Regulation and Abolition) Act, 1970 but tighten up Section 10 so that ambiguity about continuance of contract labour and absorption following abolition is removed.

b) Frictions faced in the creation and closure of firms in response to normal competitive market dynamics. Competition cannot function without free exit. The Industrial Disputes Act, 1947 makes it impossible for companies to exit. It becomes imperative that given the other provisions of labour legislation, the requirement of governmental permission be dispensed with, without adversely affecting the interests of labour.

c) Skill development is important especially for the manufacturing sector. Strengthening education & skill building need the attention of both the government as well as the industry in association with the academia. Isolation of
education (even training) from the production sector is the basic flaw of the Indian system. So coordination between the availability of skilled engineers and technicians for manufacturing industry should be maintained.

d) The quality of technical education at the vocational level as well as at the University and sub-university levels is a cause for concern. Special focus needs to be given to issues relating to the emerging requirements of Industry while designing the syllabi for these institutions. It is important to attract the best minds to teaching and R&D in our institutes of higher learning especially in science and technology.

e) Growth of manufacturing sector is conditioned by various actions, laws and regulations of Central, State and Local level government. It is therefore essential that the Centre as well as the States act in a coordinated manner to create the necessary conditions for investment and growth of the manufacturing sector by undertaking full fledged reforms in respect of the rules and regulations. Several problems at the ground level lead to higher transaction costs. Hence, State Governments would need to address vital areas like taxation, availability of land and other infrastructure requirements like water, electricity, implementation of regulatory laws dealing with labour, environment, etc. in order to make manufacturing competitive.

f) Regarding the sustainability of growth of manufacturing sector, two factors seem to be the causes for concern. First is the high resource intensity of manufacturing sector and the second is the intra-sectoral disparity, between organised and unorganised segments of the manufacturing sector, which seems to be getting
more widened. On the whole, it is the supply constraint, in the form of technological upgradation, organisational and institutional constraints that seems to be the problem with the Indian manufacturing sector rather than the demand constraint emanating from low growth of agricultural sector, especially for organized manufacturing sector. Atomistic markets, such as, food industry, leather, chemical and textiles are in need of institutional mechanisms, which will provide them with key inputs including technology for their improved performance.