CHAPTER VII

SUMMARY

AND

CONCLUSIONS
Steel is one of the most common materials that we come into contact with every day. There is hardly any object that we use today that does not contain steel or that is not created with equipment made of steel. We depend on steel for housing and health. It is at the root of the quality of life. Steel is one of the basic or key industries in the national economy of any country. The iron and steel industry constitutes one of the main foundations on which the industrial structure of the country can be built. It is the core industry for the primary, secondary and tertiary sectors. Steel is used as the basic material in the manufacture of tractors, power tillers and other farm machinery and food processing plants, in the building of factories, plants and industrial machinery as well as automobiles, railways, ships, power and telecommunication sectors.

According to the International Iron and Steel Institution (IISI), during the year 2009 world crude steel production stood at 1220 million metric tonnes. Now Asia has become the largest producer of steel in the world.

The Indian steel industry is almost 100 years old now, but the real beginning was only made in the 20th century. In 1906 a mill was setup in Bihar and now it is known as Tata Iron and Steel Company (TISCO). It is today one of the principal producers of steel in India. In 1973 the Government of India formed a holding company called as Steel Authority of India Limited (SAIL). The Indian steel sector is booming and now it occupies the fifth position globally. In the year 2009 India's crude steel output of 56.6 million metric tonnes constituted 4.64 per cent of the total global production.

The strong growth in the GDP in the second quarter of the current fiscal and in the IIP during April-November 2009 suggests that the demand side of the steel industry is back on a stable footing. Indian steel outlook for 2010 continues to be positive, since Indian steel consumption is expected to rise at the rate of 6-9 per cent during the current year, on account of higher demand from the real estate, construction and automobile sectors (Economic survey 2009-10).

The trends of productivity growth and degree of elasticity of substitution of manufacturing sector have been considered as the most significant policy variables in the formation of growth oriented industrial strategy in developing countries.
Productivity growth is a fundamental way for society to improve its living standards. The analysis of productivity growth by industry or firm provides an important tool for assessing how individual activities contribute to the changing structure of the dynamic economy. Industrial development is a major factor in the economic development. It plays a vital role in improving employment opportunities, generating incomes, contributing to the maintenance and improvement of society’s capital assets and assisting the general improvement in the economic and social welfare.

The role of productivity in accelerating the pace of economic growth is well recognized in both theoretical and empirical literature on growth. The analysis of productivity is essentially important to analyse the dynamics of economic growth. To study the behaviour of an industry or enterprise, it is essential to make a scientific appraisal of the trends in productivity efficiency with which the resources are converted into goods and services.

Many studies have analyzed the Indian steel industry performance without making any reference to factor substitution. The studies have not focused on productivity measure and factor substitution across India. In the light of this observation, the present study attempts to study the growth performance, partial factor productivity, total factor productivity, factors affecting the productivity and factor substitution for the selected Indian steel companies. Because of the growing importance and need for steel, an attempt has been made to study the selected Indian steel companies with the following objectives. The specific objectives of the study are

1. To examine the growth performance of the selected Indian steel companies;
2. to study the trends in partial productivity indices and estimate the relationship between labour productivity and capital intensity;
3. to estimate the index of efficiency of Labour input;
4. to estimate total factor productivity indices and identify the factors that influence productivity; and
5. to measure the technical bias in the selected Indian steel companies using transcendental logarithmic production function framework.
7.2 CONCLUSIONS

Growth Performa

The growth rates of value of output, income and assets for selected steel companies are accelerated except for GKW Ltd., during the period 1989-2009. It is observed that there is a positive growth in income generation and in the output of all selected steel companies. The growth rates of GVA for all companies are positive except for HCL and GKW during the overall period. The sales of all the companies have registered positive growth and are significant. It is also observed that the sales of GKW have shown a declining trend and it will affect on their income and future expansions.

The growth rates of fixed capital are positive and are significant at 1 per cent level for seven companies out of ten companies. The RINL registered negative growth and it is significant. The growth rates of fixed capital of HCL and GKW are insignificant during the study period. It is also observed from the analysis that there is a negative growth in employment of seven companies. The HIL and NALCO have registered positive growth and are significant at 1 per cent level.

The growth rates of compensation to employees registered positive growth and are significant at 1 per cent level for all companies during the overall study period except GKW which has noted negative growth. The total expenditure of all companies has registered positive growth and is significant, except GKW Ltd. which registered a negative growth rate. The growth rate of power & fuel consumption has noted increasing trend. The raw material consumption has registered negative growth during the first and overall periods. The growth rates of depreciation are positive and are highly significant for seven companies during the period 1989-2009. The interest payments have noted positive for TSL, HIL and BALCO during the period 1989-2009.

Structural ratios

The value added per unit of output has been increasing in RINL and MEL. In case of TSL, NALCO, HZL and GKW have registered low growth rates. The fall in value added per unit of value of output may be associated with a fall in compensation to employee per unit of output. The gross value added per unit of fixed capital (GVA/FC) has declined for HIL, HCL and GKW during the period 1989-2009. It is clear that the
fall in value added per unit of fixed capital ratio may be because of raising capital intensity in the above companies. The value added per employee (GVA/EMP) is observed for all companies. It registered positive growth and is significant during the period. It is clear from the analysis that the value added per employee has increased profits of the company. The average compensation to employee (COMP/VO) is highly experienced in NALCO followed by RINL, MEL, HZL, TSL, SAIL, BALCO, HCL, HIL and GKW during the study period. The share of compensation to employee in value added (COMP/GVA) declined for the HZL, HIL, TSL, BALCO and HCL companies during the overall period 1989-2009. Besides, it is clear that the non-wage share has increased in the above companies.

Partial Factor Productivity

The highest growth rates of capital productivity have been observed in RINL followed by NALCO, SAIL and HZL respectively and are significant. In the cases of MEL and HCL the growth rates are positive but they are insignificant for the overall study period. From the analysis it is clear that the capital has been influenced in six companies during the study period. The highest labour productivity has been observed in HZL followed by TSL, HIL, RINL, BALCO, HCL, SAIL, NALCO, MEL and GKW and is significant at 1 per cent level respectively. It is also observed that the labour productivity has greater influence on overall productivity of the companies. From Coefficient of Variation, it is observed that there is a greater variability in the labour productivity indices of HZL, BALCO, GKW, TSL, HIL, HCL, RINL and SAIL during the period 1989-2009.

The growth rates of material productivity have registered positive for the RINL followed by HIL, HZL, BALCO, TSL, MEL, NALCO, SAIL and HCL during the study period. From the Coefficient of Variation (CV) it is observed that the material productivity of NALCO registered high variability, whereas the other nine companies have registered low variability. The growth rates of energy productivity of three companies RINL, MEL and HZL are positive and are statistically significant at 5 per cent level, and the remaining seven companies have registered positive growth rates but they are insignificant. From the analysis it is clear that the energy has been influenced in only three companies during the study period. From the coefficient of variation, it is observed that there is a greater variability in the energy productivity indices of TSL,
HCL, HZL and MEL companies and in the remaining six companies there is a less variability is observed during the period.

The highest rate of capital intensity growth has been observed in GKW followed by HIL, TSL, HZL, BALCO, HCL, SAIL, NALCO and MEL and these growth rates are statistically significant at 1 per cent level during the overall study period. The process of liberalization in the form of removing obstacles in areas of licensing, installed capacities, investment etc., promoted the capital accumulation per employee in the all companies. From Coefficient of Variation (CV), it is observed that there is a greater variability in the capital intensity of HZL, BALCO, GKW, TSL, HIL and HCL compare to NALCO, MEL, RINL and SAIL companies, during the study period 1989-2009.

**Relationship of Labour Productivity and Capital Intensity**

It is observed that there is a significant association between capital intensity and labour productivity in all selected 10 Indian steel companies and the effect of technical change on labour productivity has been estimated. Hence it is clear that there is a significant effect of technical change on labour productivity in SAIL, TSL, RINL, MEL, NALCO, HZL, HIL, HCL and BALCO companies.

**Index of Efficiency of Labour**

It is observed from the analysis, that the efficiency of labour is greater than zero is noted in seven companies MEL, SAIL, TSL, RINL, HIL, HCL & BALCO during the period 1989-2009 and it implies that the actual growth exceeds the desired growth and from these it is concluded that the production is being organized in such an efficient manner that more gains in the labour productivity become possible than is permissible by the technical relationship of capital-labour and output-capital ratios. On the whole, most of the companies are moving the right directions and performed much better in the use of labour input for the study period.

**Total Factor Productivity**

Kendrick, Solow and Divisia total factor productivity indices and their growth rates have been calculated. From the analysis it is clear that out of ten companies eight
companies have registered positive growth rates and among them the growth rates of just six companies are statistically significant at 5 per cent level. The growth rates of Kendrick indices indicate that there is an increasing technological progress in six companies, there is no technological change in HIL, HCL & BALCO and technological retrogression in GKW.

From the analysis of the Solow indices, it is clear that growth rates of six steel companies have registered positive growth and are significant at 5 per cent level during the study period. In the cases of MEL, HCL and GKW have registered negative growth rates and are significant at 5 per cent level. From the results it is observed that out of ten companies, six companies have made technological progress, three companies witnessed technological retrogression and one technological neutrality during the period 1989-2009.

The Divisia indices of TFP and their growth rates of ten selected Indian steel companies posted positive growth and are significant at 5 per cent level. In the case of GKW and HCL the growth is declining and in BALCO there is low growth during the study period 1989-2009. These results revealed that six out of ten companies' exhibit technological progress and technological retrogression is observed in GKW and HCL, and in the remaining two companies technical neutrality is observed during the study period. From the coefficient of variation, it is observed that there is more consistency in the Divisia indices of eight companies.

Factors Influencing the Total Factor Productivity

Using log-linear regression analysis, factors influencing productivity of selected Indian steel companies has been obtained. On the whole there is a positive influence of value of output on TFP but, at the same time, there is a negative relationship of capital intensity with the TFP. These indicate improper mix of using different factors comprising in the production process and inefficiency in the utilization of available resources. The contribution of average wage ratio on productivity is high in the companies MEL, HZL and BALCO indicating that the skill of the managerial as well as the productive workers engaged, as a result of the modernization of the companies, is high in quality. The export intensity variable is positively significant for only three companies SAIL, NALCO and HIL out of ten companies. These results strongly
indicate that, the variable export is contributing very much for the overall productivity. In the case of GKW, BALCO, HZL and RINL there is a negative relationship of export intensity on total factor productivity. TSL and HCL have positive impact of export intensity on total factor productivity but the impact may not be significant.

Translog Production Function

The estimates of Translog production function with symmetry constant returns to scale for the selected ten steel companies in India are reported for the period 1989-2009. It is concluded that the majority of the coefficients are statistically significant also. It is observed that the average product of labour, Energy and Material inputs are having a significant impact on the output for all the selected Indian steel companies. It is evident that the managerial skill component has significant effect on the output of all the above said companies for the study. The marginal productivity of labour of five companies TSL, HIL, HCL, BALCO and GKW are having a significant influence whereas in the case of the remaining five companies SAIL, RINL, MEL, NALCO and HZL it is not having significant influence which means the labour has reached the maximum stage or there may be excess of labour in these five companies. The marginal productivity of energy and materials consumed is statistically significant for all the selected Indian steel companies during the period 1989-2009.

Allen Partial Elasticities of Substitution

The capital and labour tend to be quite substitutable in four companies SAIL, MEL, HZL and BALCO but the remaining six companies TSL, RINL, NALCO, HIL, HCL and GKW showing complementarities. The capital and energy are substitutable only in two companies MEL and NALCO, whereas other companies SAIL, TSL, RINL, HZL, HIL, HCL, BALCO and GKW display complementarities. Substitutability in capital and material inputs is observed in seven companies TSL, NALCO, HZL, HIL, HCL, BALCO and GKW, but in the remaining three companies SAIL, RINL and MEL there are complementarities. The labour and energy display substantial complementarities in four companies SAIL, RINL, HIL and GKW. In the remaining six companies TSL, MEL, NALCO, HZL, HCL and BALCO substitutability is observed.
Own and Cross Price Elasticities

The own and cross price elasticities of factor demanded have been calculated at the mean of the fitted output shares. The own price elasticities of capital and labour are less than one for most of the companies. It is clear that the own price elasticities of demand for capital and labour is indicating that the demand curve is downward sloping. The own price elasticities of materials are positive for only three companies SAIL, RINL and MEL out of ten companies. The cross price elasticity of demand in capital and labour is negative for six companies, TSL, RINL, NALCO, HIL, HCL and GKW, indicating that the cross price elasticity demand is inelastic. The cross price elasticities of demand between labour and materials are positive for most of the companies, indicating substitutability between the two inputs.