CHAPTER-II

LITERATURE REVIEW

The available review of literature on Indian Manufacturing Sector is presented in chronological order. The reviews are from different dimensions divided into five sections. A study pertaining to Production Function Approach has been discussed in section I. Section II throws light on studies relating to Technical Efficiency measurement; the review of studies concerning Employment has been discussed in section III; the studies pertaining to Productivity measurement has been discussed in section IV and; studies pertaining to Small Scale industries are in section V.

The available reviews on the literature which are relevant to the present study are presented in following five sections.

Section I

2.1 Studies Pertaining to Production Function Approach

Banerjee (1975) examined the relationship between capital intensity and productivity in the context of Indian manufacturing industry. The analysis has been carried out for manufacturing sector as a whole and five individual industries (viz. cotton textiles, Jute textiles, sugar, paper and bicycle) by using CMI and ASI 31 data for the period 1946-64. The study highlighted that the performance of the manufacturing sector was sluggish over the period 1946-64. While labour productivity showed a significant upward trend during this period, this sector did not indicate the presence of any ‘technical progress’. The hypothesis of constant returns to scale was not rejected. It has been found that elasticity of substitution between capital and labour is near unity in almost all the industries.

Qomen and Evenson (1977) attempted to measure scale economies, elasticity of substitution and total factor productivity growth using various forms of Cobb-Douglas (CD) and constant elasticity substitution (CES) production functions (viz. CD (conventional), CD (scale version), CES (Kmenta approximation), SMAC relation, Scale modified SMAC relation in the seven major agro-based industries with thirty-one sub-industries in India using ASI data. The data for three-digit level industries covered a period of three years. However, the four digit and five digit level industrial data covered only eight years, i.e. up to the year ending March 31, 1967. The
estimates of elasticity of substitution between capital and labour were found to be low, that is below one. This result varied from industry to industry. The study concluded that the Indian manufacturing sector appeared to be relatively inefficient though the TFP measures did show some improvement over time. However, significant inter-industry differences in TFP have been noticed.

Goldar (1983) examined productivity trends in Indian manufacturing sector and estimated Total Factor Productivity (TFP) by applying Solow index and Translog index using firstly 1951-65 data covering all Census of Indian Manufacturing Industries (CMI) except “general engineering and electrical engineering” industry for 1951-58 and Annual Survey of Industries (ASI) data for 1959-65 and secondly, during the period of 1959-78 based on ASI data. This analysis shows a rising trend in labour productivity and capital intensity and a falling trend in capital productivity during this period. Growth in TFP seems to have been rather sluggish and its contribution to output growth is quite small. The observed rise in labour productivity and fall in capital productivity may accordingly be attributed to increasing capital intensity. Substitution of labour by capital seems to be the main feature of industrial growth. The result of Cobb-Douglas function estimation favours the assumption of constant returns to scale implicit in the TFP indices which is in broad agreement with the results of TFP indices especially in terms of the direction of TFP growth. The study has pointed out that the general industrial situation was not conducive to productivity growth. Under-utilisation of capacity, shortage of fuels, power and transport facilities and deteriorating industrial relations had a significant depressing effect on productivity growth. Moreover, gestation lags in the basic and capital goods industries, which accounted for a dominant part of investment in post 1956 period, must have had a depressing effect on productivity growth. A pronounced rising trend in capital intensity was found, which implied that the growth in industrial employment has badly lagged behind the growth in industrial investment and output. To some extent this is a result of the changing industrial structure in favour of basic and capital goods industries. It has been observed that metals, chemicals, rubber, petroleum and machinery industries are among the lowest ranked in terms of TFP growth, since these are the industries in which import substitution has been attempted on a considerable scale. Though the policy of import substitution contributed much to the objective of self-reliance, yet it has been contrary to productivity growth.
Ahluwalia (1991) analysed the total factor productivity growth (TFPG) performance of Indian manufacturing sector at a detailed level of disaggregation (for 63 industry groups of manufacturing at one level and for used-based sectors, i.e. intermediate goods, consumer non-durables, consumer durables and capital goods, at another level) by using ASI data for the period 1959-60 to 1985-86. The analysis of translog index of TFPG clearly brought out the poor performance with respect to TFPG up to the end of the seventies. She found a structural break in the TFPG in early eighties, which she called a ‘turnaround’ in TFPG behaviour. An important feature of the improvement in TFPG in the first half of the eighties was that it largely reflected improvements in labour productivity. Capital productivity showed neither an increase nor a decrease. The consumer goods sector was the leader in the turnaround in TFPG after 1979-80. The intermediate goods sector, which was worse performer in the seventies, showed a significant improvement later although its TFPG continued to be relatively low, i.e. 1.4 percent per annum. The capital goods sector showed a considerable improvement from 1.7 percent per annum to 3.4 percent per annum, but the improvement was not statistically significant. The production function analysis based on Translog production function using pooled cross-section and time-series data showed that there has been negligible and insignificant growth in TFP in the manufacturing sector over the period from 1959-60 to 1982-83 and there was a distinct upward shift after 1982-83. The estimates for the sector as a whole also suggested that the returns to scale are not constant and the technical progress had a capital saving bias. Among the used based sectors, the hierarchy of TFPG remained nearly the same as the two larger use-based sectors (i.e., intermediate goods and consumer non-durables) performed badly compared to the other two sectors. The upward shift in TFPG was established for all the sectors except capital goods. Technical progress was found to be Hicks-neutral in intermediate goods and capital saving in consumer non-durables and capital goods. In consumer durables, however, there was evidence of the emergence of a capital using bias in the eighties. Ahluwalia found that improvement in the infrastructure sectors and reorientation in the policy frame are the two significant factors behind the turnaround in the productivity growth in the eighties.

Srivastava (1996) studied productivity growth in Indian industry for the period 1980 to 1989. Based on RBI data, the author estimated TFPG by using both
growth accounting and production function approach. While growth accounting approach showed a significant decline in TFPG from -0.35 per cent per annum during 1980-84 to -2.37 per cent per annum during 1985-89. As against this, TFPG on the basis of production function approach showed a significant improvement during the study period.

Gangopadhyay and Wadhwa (1998) analysed, at the disaggregated level of two-digit industrial classification, the changing pattern of labour productivity, labour costs and TFP in Indian industries for the period 1973-74 to 1993-94. They divided the entire study period into two sub periods, 1973-84 and 1984-94. It has been found that the increase in capital intensity was accompanied by gains in labour productivity. The rate of growth of labour productivity was consistently higher in the second sub-period in all industries. The study also explored that gains in labour productivity were associated with falling unit labour costs over the period. In four major exports driven industries, namely, textiles, leather, metal products and other manufacturing, the rising labour productivity, capital deepening and falling labour costs were accompanied by a rise in the rate of growth of employment and wages. Total factor productivity growth (TFPG) estimates were obtained by two methods, the growth accounting approach and the production function approach. The analysis of estimates of TFPG obtained from Translog index showed that the front-runner in the TFPG performance is the export driven industries. The only industry in which TFP fell during the period 1974-93 was wood and wood products. Most of the industries experienced a turnaround in the early 1980s in respect of TFPG but there seems to be a reversal afterwards. The results of panel estimation of the translog production function with and without industry effects showed that TFP grew at the rate negative two percent during the period 1973-74, and technical change was not Hicks-neutral, but capital augmenting. In their study they mentioned that their results were in contrast of the results of the Ahluwalia’s (1991) in following respect: it confirmed labour saving bias in technical change while the Ahluwalia’s study found capital-saving bias; and Ahluwalia found a structural break in TFPG since 1982-83 while no such structural break was found in their study of TFPG from 1980 to 1992.

Neogi and Ghosh (1998), in their paper titled ‘Impact of Liberalisation on Performance of Indian Industries: A Firm Level Study,” assessed the impact of liberalisation on the performance of four-selected industry groups, namely, (1)
chemical, (2) textile, (3) non-metallic mineral products and (4) electric machinery, by using firm level data for period 1989-94. The performance indicators chosen to study the impact of economic reforms on the firms were labour productivity, growth of value added, capital intensity and total factor productivity (TFP). The estimates of technical efficiencies of selected industrial groups were obtained by using frontier production model with the help of Corrected Ordinary Least Square (COLS) method. The results indicated that productivity growth and efficiency levels have not improved as per expectation during the post-reform period and the distribution of efficiency is skewed. The TFP growth has fallen very sharply during the period of reforms with the exception of chemical industry. The relationship between labour productivity and capital intensity indicated a general downfall of efficiency of the firms during the study period. The level of technical efficiency for all the industries was found to be very low and no significant improvement was observed in this level during the post reform period and distribution of efficiency is skewed.

Mahambare and Balasubramanyam (2005) in their study analysed the impact of trade liberalisation on Indian manufacturing sector. The study evaluated the firm level technical efficiency in India since 1991 reforms by estimating Cobb-Douglas production function for thirteen manufacturing sectors. The study revealed the mixed impact of 1991 reforms on the selected manufacturing sector. Average technical efficiency of firms increased in eight out of thirteen sectors studied. Improved access to imported technology in the post-reform period seems to have had a positive impact on the efficiency. Although foreign owned firms continue to be the most-efficient, yet their advantage in technical efficiency seems to have declined in the late 1990s. Technology acquisition, efficient utilisation of resources and infrastructure development were considered some of the factors which possibly contributed to the increase in total factor productivity growth.

Hina Sindhu (2007), in her paper “Share of wages and Competitiveness in Indian industry,” analyse that in the era of globalisation, industrial competitiveness has taken the centre stage of policy discussions in the developing countries like India. Unit labour costs are used to measure the competitiveness because author felt that the wages form a major component of the fixed costs. Fixed costs directly impact the profitability. There are considerable variations in the wage rate and labour productivity across the different sub-sectors of the Indian industry. Statistical analysis
indicates that the labour productivity has significant influence on the wage rate. In the context of the ongoing debate pertaining to increasing wage inequality vis-a-vis competitiveness of the domestic industry, this study reveals that the wage rate has increased over the period of time while the share of wages in value added has declined and the study concludes that the competitiveness of each sub-sector of the Indian industries has improved over a period of time.

Vinish Kathuria, Rajesh Raj S N and Kunal Sen (2010), in their paper analyse the productivity performance of the Indian manufacturing sector using unit level data for the period 1994-95 to 2004-05 for 15 major states. Their study focuses on the both organized and unorganized segments of the manufacturing sector. They employ partial and total factor productivity (TFP) to trace the productivity performance of formal and informal manufacturing sector. Their analysis revealed that labour productivity has increased for organized sector over time whereas both labour productivity and capital intensity growth have slowed down in the unorganized sector. They estimate TFP through C-D function which shows that capital has played a more significant role in the production process in the both the sectors and they also found that output growth in the both the sectors is productivity driven and not input driven.


Section II

2.2 Studies Pertaining to Technical Efficiency Measurement

Goldar and Aggarwal (1992) examined the extent of technical efficiency in Indian engineering industry for the year 1987-88. For this they estimated three inputs frontier production function by corrected ordinary least squares method for top hundred engineering firms. Average technical efficiency was found to be 58.7 percent. The best five firms in terms of technical efficiency were found to be Maharashtra Scooters, Bajaj automobiles, Bharat Heavy Electricals, Bharat Earth Movers and Indian Telephone industries. Around twenty five percent of firms were found to have fifty percent efficiency level. Major determinants of efficiency were found to be size of the firm, expenditure on research and development, import-intensity etc. Also, it was found that efficiency is lower in public sector firms compared to firms in the private sector.

Dipankor Coondoo, Chiranjib Neogi, Buddhadeb Ghosh (1993), in their paper titled “Technology Intensive Industrialisation in LDCs: Experience of Indian Industries,” revealed that the growth and composition of industries have been fast changing in the LDCs mainly through foreign collaborations during the last few decades. But they wanted to examined does this tendency of technology import generate efficient utilisation of inputs when the process is becoming more capital deepening as reflected in rising capital coefficients. Their study revealed some interesting phenomena regarding the performance of Indian manufacturing industries over the period 1974-75 to 1985-86. Their study shows that while output 'grows at a very moderate rate, capital coefficients, on the other hand, rise at remarkably high rates. But this increasing capital coefficient fails to produce higher labour productivities across industries.

Chandra and Shukla (1994), in their paper “Manufacturing Excellence and Global Competitiveness- Challenges and Opportunities for New Indian Industries,” analyze the manufacturing capabilities of new Indian industries to face the competitive challenges and present the new manufacturing paradigms. The paper argues that the opening up of the economy to global competitive forces is posing new challenges and opportunities to Indian manufacturer. But ability to compete depends on the dynamism of firms to develop competitive management practices. Besides, the
competitive ability of national industries also depends on the endowed factors like infrastructure, human resources and scientific and technological research and development and the existence of related industries especially the capital goods industries. Analyzing the manufacturing ability through the past performance of firms, they conclude that there is a need to develop manufacturing excellence in order to deliver a sustained level of economic growth in the future.

Jha and Sahni (1994) examined the efficiency of Indian sugar industry using CMI and ASI data for the period 1960-61 to 1986-87. Using the translog cost function, the study observed a lenient downward trend in the pattern of allocative inefficiency in the Indian sugar industry. The following conclusions were drawn by their study the elasticity of cost with respect to output confirmed the presence of diseconomies of scale in the industry; the government’s decision to expand capacity in the industry is wrong; complementary nature of labour and capital is observed throughout the study period; no major structural break has been observed in the pattern of production; and a mild downward trend in the pattern of allocative inefficiency in the Indian sugar industry was observed.

Neogi and Ghosh (1994) made an attempt to investigate the inter-temporal efficiency movements and inter-industry efficiency variations in Indian manufacturing sector. They used panel data collected from Annual Survey of Industries over the period 1974-75 to 1987-88. Using two basic approaches for measuring technical efficiency it was found that most of the industries concentrated below 50 percent level of efficiency and there was an overall declining trend across industries with some exceptions where efficiency raised remained sluggish.

Gajanan (1995) measured the technical efficiency of the industrial groups affiliated under the 3-digit classification of Food and Tobacco, Cotton Textiles, and Non-metallic Metals, Machinery and Electrical Equipment industries. Using the stochastic production frontier approach, the findings revealed that average technical inefficiency measures increased for each industry during the year 1985 in comparison to the year 1976. Also, the analysis of relative measure of inefficiency reveals that each industry has become more inefficient eventually.

Jensen and Krishna (1996), in their article entitled “Entry Policy in an Open Economy,” have attempted to examine how various characteristics of the industry
affect changes in welfare due to entry policy. By using open economy model, the paper argues that with both home and foreign firms present in a market, liberalization of entry could raise or lower welfare. In India licensing had kept the number of firms low, so that liberalizing entry was likely to be beneficial to begin with. The paper concludes that allowing for foreign firms in the industry can directly alter the direction of the entry bias by shifting profits away from home country. They have shown that the optimum number of firms exceeds the free entry level if there is significant difference between the regulated (1985-86,1990-91) and liberal (1991-92 to 1995-96) economic policy regimes with respect to foreign equity participation, in house Research and Development efforts, technology imports, capital intensity, advertisement, exports, growth and profits. This difference in the ability of firms to be more growth oriented way was not only due to the trade labialization measures and exchange rate de-control introduced by the government of India during the 1990s, but also to the technological paradigm shifts that they could accomplish through intra-firm transfers needless to mention that these transfers have mostly been from the parent multinationals to their local affiliates.

Klaus-Dieter Schmidt (1997), in his working paper titled “Corporate Restructuring and Export Performance in the Transition Process-The Case study of Easter Germany,” examined the export performance during transition process in Eastern Germany. Economic restructuring in the transition from plan to market concerns the way enterprises try to achieve competitive advantage. According to him, enterprises have to decide where to compete, that is to say with which product they should enter which markets, and how to compete, that is by which strategy they could succeed. During the seven years since unification, the eastern German economy has undergone considerable structural changes. However, the outcome is poor market specialization: industries which sell their products mainly in local markets have remarkably increased their share in total output, while industries producing for worldwide markets have lost importance. Sailing into the safe harbour of local markets may be the need of the moment for many companies. But it is a dangerous strategy. In the long run, it may prove to be a trap without any escape. His paper provides a selective and interpretative account of the restructuring process in eastern German manufacturing. It starts with the given constraints — exchange rate and wage convergence — which constitute the wrong model for opening up a closed economy.
It presents some stylized facts revealing a strong vertical differentiation between eastern and western German producers — with respect to product quality and product markets as well as with respect to technological and organizational environment. As a result, the division of labour between the eastern German economy and the rest of the world tends to be an inter-industry type rather than an intra-industry one. Finally, his paper turns to the key policy question of how to overcome these difficulties. He scrutinizes the main arguments for and against government's trade promotion towards eastern German enterprises.

Ray (1997) used the non-parametric method of DEA to measure Malmquist productivity indices for manufacturing in the different states of India during 1969-84. The measured Malmquist index was used to decompose the contribution of technical change, change in technical efficiency, and change in scale efficiency. The analysis shows an overall average decline at the rate of 2.89 percent per annum. At the individual level, although most states experienced productivity decline, considerable regional variations were evident. A non-parametric decomposition revealed that regressive technical change accounts for most of decline in productivity. A multivariate regression analysis has been carried out with average annual productivity growth rate in a state as dependent variable and a number of socio-political and economic variables as regressors. The results of regression analysis showed that while an increase in degree of urbanization and the capital labour ratio increased productivity growth, a higher proportion of non-production employees to production employees stuck.

Haishun Sun, Phillip Hone and Hristos Doucouliagos (1999), in their paper titled “Economic Openness and Technical Efficiency: A Case of Chinese Manufacturing,” analysed the technical efficiency of industries in a transitional economy: China. Using data for 28 manufacturing industries across 29 provinces with the Data Envelopment Analysis approach, the technical efficiency of each industry was measured and compared across regions and provinces. They analysed determinants of differential technical efficiency performance, with a particular focus on the impact of trade orientation and foreign investment. They conclude that trade openness is found to have a positive effect on technical efficiency.
Kumar (2001) analyse regional variations in technical efficiency of Indian manufacturing sector using the method of Stochastic Frontier Analysis (SFA). The results revealed wide variations in the technical efficiency of manufacturing sectors of different states. The highest level of technical efficiency was observed in the manufacturing sector of Maharashtra. The states of Maharashtra, Karnataka, Gujarat and Haryana operate close to maximum technically feasible production levels since their manufacturing sectors realized more than 90 percent of their technical potentials. In the remaining 11 states including the industrially developed states of West Bengal and Tamil Nadu, the level of technical efficiency was observed to be less than 80 percent. Was also been found that the mean technical efficiency for 15 states was 77 percent.

Unni et al. (2001), in their paper analysed the trends in growth and efficiency in the utilization of resources in the Indian manufacturing industry before and after the introduction of economic reforms. The study used a comparative analysis of the Indian figures with Gujarat, one of the most industrially developed states of the country for four period of time 1978-79, 1984-85, 1989-90 and 1994-95. The data has been taken from the Annual Survey of Industries (ASI) and National Accounts Statistics using the growth accounting technique for four data points. The results showed that the growth in manufacturing sector in Gujarat was more efficient than the average all-India growth after the reforms. The average TFPG in India was negative during this period. Gujarat’s strategy of physical infrastructure development leading to industrialization has been the main reason for the growth of the state’s manufacturing sector.

Aradhan (2002), in his article entitled “Liberalization, Multinational Enterprises and Export Performance: Evidence from Indian Manufacturing,” has attempted to analyse the inter firm determinants of export performance in Indian manufacturing in the late 1990s. He tests two empirical hypotheses: first that in a liberalized regime MNE affiliates perform distinctly better than their counterparts on export markets in a globalised economy; and two, the MNE affiliates have greater competitive advantage in high-tech than in low and medium-tech industries. The disaggregated industry-group-wise analysis of the study indicates that MNE affiliates perform no better than local counterpart in high-tech industries. Thus, even with a higher level of integration with the global economy in the 1990s. India appears to fail
in attracting FDI on significant scale, particularly in high-tech industries. Imports of raw materials enhance the export competitiveness of firms in all industry groups. Finally, large firms are found to be more export oriented, implying the need for creating large flagship companies in the country. The empirical analysis of the study suggests that it is crucial for the developing countries to upgrade the competitiveness of their own resources and capabilities, without improving a well-developed economic cluster and good human and physical infrastructure. The results also suggest that deliberately government should promote a strong nucleus of flagship indigenous firms in internationally oriented sectors to compete in the world markets. The present study however, shows that increasing liberalization of the economy, intensified competition and exchange rate correction favored large firms in the world markets in the 1990s.

**Ebruevo Yolda and Ering Yeldan** (2002), in their paper “The Impact of the Liberalization Program on the Price-Cost Margin Investment of Turkey’s Manufacturing Sector After 1980,” investigated the structural consequences of the post-1980 outward-orientation on the market concentration and accumulation patterns in the Turkish manufacturing industries. Using various panel data procedures over twenty-nine subsectors of Turkish manufacturing for the 1980-1996 period, they focused on three sets of issues: (1) the effect of openness on the extent of market concentration as measured in CR4 ratios; (2) the behavior of gross profit margins (markups) in relation to openness, concentration ratios, and real wage costs; and (3) the behavior of sectoral real investments (by destination) in relation to the profit margins, real wage costs, and the openness indicator. Their results suggest very little structural change in the sectoral composition and nature of market concentration and behavior of profit margins under the post-1980 structural adjustment reforms and outward-orientation. They find that, contrary to expectations, "openness" had very little impact, if any, on profit margins (markups), and, within manufacturing, the trade-adjusting sectors reveal a positive relationship between the profit margins and openness. Profit margins are found to be positively and significantly related to concentration power and real wage cost increases. Real investments in the sector display a positive relationship with profit margins and real wages yet bear statistically insignificant relationship openness.
Parmeswarn (2002) in his study examines the impact of economic reforms on technical efficiency using firm level data for selected industries in India. Using the technique of SFA, the study revealed that all the industries considered had registered a higher rate of technical progress in the post reform period. The effect of change in the policy environment on technical efficiency was found to be varying among industries. The study also found that firms’ involved in the international trade through export and import of raw materials and technology had a positive effect on technical efficiency.

Ray (2002) in his examined whether India’s Economic Reforms have improved efficiency and productivity, using Non-Parametric Analysis for the period 1986-87 to 1995-96. The study considered 22 Indian states to estimate efficiency and productivity trends. After dividing the data into two sub periods i.e. pre-reform period up to 1991 and post-reform period after 1991, the study found that the states with higher capital-labour ratio and higher percentage of the urban population experienced a greater acceleration in the productivity growth rate after the reforms. At the same time there was a tendency towards convergence in the sense that a higher pre-reform growth rate led to less scope for further improvement. The study also revealed that on the average the annual rate of productivity growth has been higher in the post-reform period than the pre-reform period. Still, some states have actually experienced a slowdown in the productivity growth.

Deepika Goel (2003), in her reviewed work titled “Impact of Infrastructure on Productivity: Case of Indian Registered Manufacturing,” is primarily focused on the productivity impacts of the provision of infrastructure on the registered manufacturing sector in India. Her study employs estimations of the cost elasticity of infrastructure inputs. For this purpose, a variable cost function model for the manufacturing sector with cost as a function of the prices of the variable inputs, levels of output and infrastructure stocks was postulated. Variable inputs include capital, labour and intermediate input. Infrastructure is assumed to be a quasi-fixed input since its provision is done mainly by the public sector and it cannot be instantaneously adjusted in the short-run. The cost function model estimated consists of the variable translog cost function and the cost share equations for the variable inputs. Time series data for the period 1965-1999 has been used. Twenty-three infrastructure variables were used in their study which, are aggregated using the principal component methodology. Three alternative specifications of the quasi-fixed inputs are explored.
The alternatives are economic infrastructure, social infrastructure and aggregate infrastructure. The estimated results suggest that infrastructure provision enhances the productivity in the manufacturing sector and it helps to lower the costs in the sector.

**Bhanu (2006)** made an attempt to examine the Capacity Utilisation pattern in 16 two-digit and 33 three-digit industries during the period 1980-2000 and postulates that Capacity Utilisation in Indian industries has been higher during the post-reform period than at any other time. Further, Capacity Utilisation in Indian industries is estimated at the aggregated level, for the pre and post-reform period, using theoretically pertinent three different methodologies. The results clearly show that temporal pattern of rates of utilization are the same; whatever the method of Capacity Utilisation is applied.

**Singh and Aggarwal (2006)** evaluated the trends of total factor productivity growth, technical change and efficiency change in the sugar industry of Uttar Pradesh using the primary data of 36 sugar firms collected over the period 1996-97 to 2002-03. The study described that the TFP in sugar industry grew at a moderate rate of 1.6 percent per annum during the entire study period. The decomposition of TFP into its two mutually exclusive events i.e., technical change and efficiency change disclose the fact that technical change dominate the efficiency change in the sugar industry of UP. Further, the results substantiate that the magnitude of average TFP growth varies significantly across ownership, size and location of sugar mills. Sector-wise estimation of the TFP reveals that the private sector has witnessed the highest growth in TFP, followed by the co-operative sector. Regional pattern of the TFP growth shows that the western region of UP achieves relatively better TFP growth than the eastern and central regions. Post DEA analysis confirms the hypothesis that TFP growth is positively associated with the plant size. It has been concluded that large-scale production in the industry may be encouraged to take advantage of the economies of scale. This would lead to greater efficiency in industry, and consequently force the production points closer to the frontier. Economies of scale in the industry attached with latest technology acquisition would be supplementary to develop downstream activities in the sugar related industries.

**Kumar and Arora (2007)** endeavoured to examine technical and scale efficiency in Indian manufacturing sector using a cross-sectional analysis of 127
manufacturing industrial groups classified at 4-digit level for the year 2003-04. Using the technique of Data Envelope Analysis (DEA), the study concluded that the average overall technical inefficiency was to the tune of 39.7 percent in Indian manufacturing. Only, nine industrial groups were identified to be globally efficient along with 17 locally efficient industrial groups. On the other hand, the observed overall technical inefficiency is dominated by improper management practices i.e., pure technical inefficiency, whereas scale inefficiency is relatively a slight source of overall technical inefficiency. Further, decreasing returns to scale was found to be prevailing in Indian manufacturing sector and the environmental variables such as capital deepening, profitability and labour skill are positively affecting the technical efficiency.

Sahoo (2008) decomposed total factor productivity into technological change and efficiency change with the help of non-parametric approach on the basis of data obtained from ASI and National Accounts Statistics. The study covers the period from 1978-79 to 1992-93, which was further subdivided into two halves: the first pre-liberalisation period (1978-79 to 1985-86) and the second transition period (1985-86 to 1992-93). The study examined the performance of 28 sunrise Indian industries and also made an attempt to show that, contrary to the impression given by Fare et al. (1994) under the assumption of constant returns to scale, the two Malmquist indices are equal in the case of technology structure involving single input output and multi input and output technology. The findings suggested that either of the two Malmquist indices and any one of the two ratio components of technical change can be taken as the measure of productivity growth and technical change respectively. Further, the study concluded that Indian sunrise industries experienced productivity decay from pre-liberalisation period to transition period of economic liberalisation. Even though industries exhibited higher technical progress in the transition period, yet this could not contribute to higher productivity growth. It is precisely due to the fact that there has been growing inefficiency in most of the industries in this period and growing inefficiency was due to the institutional and economic environment that did not completely favour the management of new technology.

Arup Mitra (2009), in his paper “Technology Import and Industrial Employment: Evidence from Developing Countries,” examines the possible effect of the imported technology on labour absorption in the industrial sector, after controlling
for real wage rate and GDP per capita based on panel data across countries. Findings tend to suggest a negative relationship between the two. Technical efficiency index derived on the basis of the stochastic frontier function framework is negatively affected by the import of technology. And he concluded that enhancing the knowledge relating to the mechanisms of exploiting the new technology would mean rising unutilized capacity and this could be due to the poor skill base of the available human capital. So in order to revive the role of industry as the engine of pro-poor growth there is a need to develop human capital and technological advancement to suit the internal labour market.

**Arora** (2010) examined capacity utilization, technical efficiency and total factor productivity growth in Indian sugar industry using the data for 31 years spanning over the period 1974-75 to 2004-05. Using the linear programming based data envelopment analysis, the study concluded that there was underutilization of capacity to the tune of 13 percent per annum. Alongside, there existed high technical inefficiency to the tune of 35.55 percent per annum. The major cause observed for such amount of technical inefficiency is managerial technical inefficiency. The analysis of TFP growth reflects that the technical progress is major source of output growth in Indian sugar industry during the post-reforms period. The analysis of impact of economic reforms delineates a precipitous decline in capacity utilization and technical efficiency during the post-reform period in comparison to the pre-reform period.
Section III

2.3 Studies Pertaining to Employment

**Magun** (1984), using input-output techniques, partitions changes in output and employment between 1971 and 1979 into those resulting from alterations in the final demand vector and in technology. The latter are in turn subdivided into changes in the requirements for intermediate inputs and for labour. Taken together, the technological changes would result in 8% less being used. For most industries this is more than offset by changes in demand.

**McCurdy** (1987) analyzed the issue of future technological impact using a much more sophisticated model than can be described here. It permits technology to affect domestic demand and net export as well as the input-output structure and stimulates a number of alternatives. Assuming no adoption, McCurdy concludes that for a plausible scenario, microelectronic based technical change results in a cumulative displacement of 5% to 6% of the required labour force from 1980-1990.

**Vijay K. Seth, Ashok K. Seth** (1991) have made an attempt to study the labour absorption capability of the Indian manufacturing sector, understand the relationship between labour absorption and phases of industrialization. For this purpose they have been estimated employment and output elasticities for the period 1960-1984 and to Their study result revealed that the labour absorption has lagged behind the rate of growth of output irrespective of the phases of industrialization and also their estimate result revealed that negative short run and long run elasticities of labour demand with respect to wage rate were greater than the positive elasticities of demand for labour with respect to output.

**R. Nagaraj** in his paper titled (1994) Employment and Wages in Manufacturing Industries, Trends, Hypothesis and Evidence, his study examines the trends in wages and power of organised labour. The study found that a sharp rise in the wage rate in the eighties in registered manufacturing due to increasing policy induced distortions in the labour market is widely hypothesized to have led firms to substitute capital for labour, resulting in the observed decline in employment along with increasing competition in the product market due to domestic liberalization; and increase in the cost of borrowed funds accounted for the decline in employment in registered manufacturing in the eighties.
Goldar (1995) estimated the TFP growth in organised manufacturing sector for the period 1970-71 to 1990-91. According to these estimates TFP in Indian manufacturing grew at the rate of 1.55 percent per annum in the period 1970-71 to 1980-81, which rose to 3.85 percent per annum during 1980-81 to 1985-86 and further to 5.05 percent per annum during 1985-86 to 1990-91.

Goldar (2000) showed that the growth rate in employment in the organized manufacturing sector in India for the period 1990-91 to 1997-98 was 2.69% per annum which was well above the growth rate of 0.53 per annum achieved in the 1980s. He attributed two major reasons for the growth in employment; slowdown in growth of real wages in the 1990s; and faster growth of small and medium-sized factories in organized manufacturing, which are more labour intensive as compared to large sized factories. He also highlighted that the increase in employment in the organized manufacturing sector, which took place in the 1990s, was accounted by private sector factories.

Nagaraj (2000), argued that faster employment generation in the organized manufacturing sector was due to the investment boon in the decade of 1990s.

Nagaraj (2004), pointed out that faster employment generation in organized manufacturing was restricted mainly to the first half of the 1990s. A boom went bust, there was a steep fall in employment in the second half of the 1990s. Relative cost of labour did not seem to matter in employment decisions, as the wage-rental ratio declined secularly. According to him about 1.1 million workers, or 15% of the workers in the organized manufacturing sector in the country, lost their jobs between 1995-96 and 2000-01.

Pulapre Balakrishnan and M Suresh Babu (2004) in their paper titled “Growth and Distribution in Indian Industry in the Nineties, found that there is a faster rate of output across manufacturing since 1991. Put then this is by no means dramatic; there is also a rise in employment, though perhaps not commensurate with the increase in the rate of growth of output. However principal among the proximate causes of output growth in the nineties has been investment with the share of investment in output having increased very substantially in Indian manufacturing. The share of investment reflects response to a regime change, the rise in its share signals the success of reforms in energizing the supply side of the economy.
Goldar (2004), by including the period 1997-98 to 2002-03 in the analysis, found some contrasting results. He found that employment in organized manufacturing during 1990-91 to 2002-03 grew at a rate of 0.5% per annum between1997-98 to 2002-03 it was negative at 2.6% per annum.

Kannan K.P and Raveendran G (2009) in their paper “Growth Sans Employment: A Quarter Centenary of jobless Growth in India’s Organized Manufacturing” attempts an analysis on growth and employment for 1981-82 to 2004-05. For the periods as a whole as well as for two separate periods, the pre and post reform phases. The picture that emerges is one of jobless growth due to the combined effect of two trends that have cancelled each other; one set of industries was characterized by employment creating growth while another set by employment displacing growth. Over this period, there has been acceleration in capital intensification at the expense of creating employment. A good part of the resultant increase in labour productivity was retained by the employers as the product wage did not increase in proportion to output growth. The workers as a class thus lost in terms of both additional employment and real wage in organised manufacturing sector.

Poonam Gupta and Utsav Kumar (2010), in their study revealed that many emerging countries in recent decades have relied on development strategy that focused primarily on promoting the manufacturing sector and export of manufacturing goods. However, an acceleration of growth of output and employment in manufacturing has eluded in India. According to them the central focus of the reforms in the 1980s and 1990s was to unshackle the manufacturing sector. Instead it is the service sector that has grown rapidly, contributing about two third of GDP growth in recent years. They argued that there are a many factors that have inhibited the growth of industrial sector in India. According to them the major factor is the rigid and strict labour laws which have affected the industrial performance.

R. Nagaraj (2014) in his study titled “ Fall in Organised Manufacturing Employment: A Brief Note: revealed that about 15% of workforce in the organised manufacturing sector lost their jobs between 1995-96 and 2000-01; about 1.1 million worker. These losses have been widespread across major states and industry groups. Real wages have practically stagnated, when percapita income grew close to 3% per year during the 1990. According to him setting up of the national renewal fund as a
component of structural adjustment programme in 1991 to finance VRS in public sector enterprises seems to have provided the initial impetus. Taking cues from it, private sector retrenched and laid off workers, as enforcement of labour laws was relaxed, which can be considered reform by stealth. Shedding of excess labour was perhaps one of the initiatives of industrial restructuring in the face of increased domestic and external competition under changed policy regime.

_Santosh Mehrotra, Jajati Parida, Sharmistha Sinha and Ankitha Gandhi_ (2014), in their paper titled “Explaining Employment Trends in the Indian Economy: 1993-94 to 2011-12” used NSSO and ASI data. Their study result revealed that structural transformation with an absolute fall in agricultural employment and a rise in non-agricultural employment, increasing participation in education, decline in child labour, mechanization of agriculture and rising living standards in rural areas due to a growth in real wages led to a decline in workforce. A fall in demand for merchandise exports, particularly labour-intensive manufacturing exports of India during 2007 to 2009 traditional items like textiles, leather and gems and jewellery and declining labour productivity from 0.165, 0.087 and 0.07 in 2004, 2009 and 2010 respectively and increasing capital intensity 0.307, 0.362 and 0.344 during same years also resulted in a decline in manufacturing employment within the manufacturing sector. Wearing apparel, textiles furniture, non-metallic mineral products and wood products, the labour intensive sectors are the areas that largely account for the fluctuations in employment in this sector and share of output in these sectors in total manufacturing value added has been stagnant.
2.4 Studies Pertaining to Productivity Measurement

Mehta (1980) attempted to analyse productivity trends for 27 Indian industries by using adjusted CMI and ASI data for the period 1953-65. The results revealed that there was a considerable diversity in the experience of different industries regarding trends of labour and capital productivity. Labour productivity was found to have increased significantly in industries like vegetable oil, chemical, tanning, glass and glassware and insignificantly in matches, iron and steel and cement industries. However, capital productivity has not increased; rather the reverse was true in most industries. The total factor productivity (TFP) of Indian manufacturing sector was found to have declined. The study noticed that most industries exhibited the presence of constant returns to scale and diseconomies of scale had not set in. The study demonstrated that there were inter industry differences with respect to the case of capital-labour substitution which primarily explained the inter industry growth differentials.

Desai and Shah (1986) studied the tendency of Indian industries over a period of time (1969 to 1980-81) with the help of Location Quotient, Coefficient of Localisation and Regional Concentration Index. The analysis has been carried out of sixteen major states industry groups at 2-digit level clubbing other minor industry groups. The data base was Annual Survey of Industries, census sector for the year 1969-70 and 1980-81. It was found that the value of Regional Concentration Index was very low probably due to diversified inherent nature of industrial base. The structural changes in the concentration of industries over time were examined through rank-correlation coefficients giving ranks to the values of Regional Concentration Index in descending order for both the years. The rank correlation was 0.82 and was statistically significant at one per cent level which indicates that there has not been significant change in the level of concentration of Indian industries. To see the relationship between the level of concentration of industries and labour and capital productivity among these industry groups, the correlation coefficients between them were calculated which turned out to be statistically non-significant. This shows that the productivity ratios did not provide better explanation to industrial concentration.
Tham Siew Yean (1997), in his paper “Determinants of productivity growth in Malaysian manufacturing sector” examined the influence of trade policies and industry characteristics on productivity growth of the Malaysian manufacturing sector between 1986 and 1991. His results show that productivity growth in the Malaysian manufacturing sector was influenced positively and significantly by the rate of growth in output, exports as well as by foreign investment. In contrast, increasing capital intensity is seen to have a negative impact on productivity growth. He also examined the labour situation that revealed severe labour constraints which may have hindered the absorption of the productivity gains from the increases in capital.

Gavin Cameron James Proudman and Stephen Redding (1999), in their working paper titled “Openness and its association with productivity growth in UK manufacturing industry,” were concerned with quantifying measures of openness and examining to association with productivity growth across 19 sectors in UK manufacturing between 1970 and 1992. Using the statistical technique of discriminate analysis, sectors were sorted into groups on the basis of their measured values of openness in 1970. Sectors classified as relatively open enjoyed significantly higher rates of total factor productivity (TFP) growth between 1970 and 1992 than those classified as closed. There was a positive correlation between the growth in labour productivity and lagged values of each of the observed measures of openness. This relationship was explained by a strong relationship between lagged values of openness and TFP growth. But, there was no evidence of a positive relationship between openness and that part of labour productivity growth explained by capital accumulation.

Pradan and Barik (1999), the study attempt to open a solution channel by considering TFPG as a result of interaction between economies of scale and technical change. Thus seek to lay emphasis on proper management of scale economies and technical change for producing a desired TFPG. The study estimates TFPG using a translog cost function. The empirical findings of the exercise on data of aggregate manufacturing sector and eight selected industries of India indicate that both scale economies and technical change have registered a declining trend in the recent years in the process of a declining TFPG.
Rajesh and Duraisamy (2002) analyzed the effect of economic reforms on Indian unorganized sector in general and on the manufacturing sector of Indian states in particular. The study identified that one of the major problems confronting the India unorganized manufacturing sector is to increase the level of production through improvement in productivity, leaving the employment-generation capacity of the sector untouched. Further, in productivity growth and efficiency aspects, a wide gap is noticed across the Indian states. A subsequent regression shows that there is a tendency towards convergence in the productivity growth rate across the Indian states. They suggest that technological upgradation needs to be prioritized if the output of the unorganized sector has to be improved.

Sudip Chaudhuri (2002) in his paper titled “Economic Reforms and Industrial Structure in India” he focused on the impact of India’s economic reforms on industrial structure and productivity. It revealed a disappointing overall performance. He classified the manufactured goods into two categories, labour intensive and capital intensive and tried to find out the behavior of these two groups using 174 three digit registered manufacturing groups. The top 50% of the 174 groups, that is, 87 groups were considered labour intensive and remaining 87 groups as capital intensive, this study found that the rate of growth of output of labour intensive goods has been slower than that of capital intensive, as a result, the share of labour intensive goods in aggregate value added has gone down between 1990-91 and 1997-98. The share of labour intensive products had gone down and labour intensity has gone down not only in capital intensive goods but also in labour intensive goods. According Chaudhuri this is not the result of exogenous factors, but the consequence of the type of policies being followed under economic reforms.

Das (2003), in his paper entitled “Manufacturing Productivity under Varying Trade Regimes: India in the 1980s and 1990s,” explores the nature and magnitude of Total Factor Productivity (TFP) change under different trade regimes. The paper argues that growth stems from two sources: factor accumulation and productivity growth. It should be noted that available evidence from various countries shows that the beneficial impact of trade liberalization, structural adjustment and industrial restructuring on productivity will take considerable time to show up its positive impact. The result of the econometric estimation of production function indicates that productivity performance seemed to worsen as the pace of trade reform gathered
momentum. It is observed that there is a marked fall in the growth rate of TFP in Indian manufacturing in the 1990s as compared to the 1980s.

Goldar and Kumari (2003) in their study examined the impact of import liberalization on productivity growth of Indian manufacturing industry in the 1980s and 1990s. The estimates obtained indicated that during the 1990s, a decade of major industrial and trade reforms, there was a deceleration in TFP growth in manufacturing. A closer assessment revealed that capacity utilisation was a significant factor which influenced productivity growth in manufacturing industries; there was an increase in capacity utilisation in manufacturing sector in the 1980s and a fall in the 1990s. Multiple regression analysis was carried out to study the factors influencing TFP growth in manufacturing industries. The results showed a significant favourable effect of tariff reforms on industrial productivity. The results also indicated that slower growth of agriculture in the 1990s and gestation lags in investment project may have had an unfavorable effect on TFP growth of Indian manufacturing industry.

Sanja. S. Pattnayak and Thangavelu. S.M. (2003), in their paper studied the effects of the key economic reforms of 1991 on the Indian manufacturing industries using a panel of manufacturing industries. They used a translog cost function to analyze the production structure in terms of biased technical change and economies of scale. A panel consisting of 121 Indian manufacturing industries from 1982 to 1998 was used in their estimation. They found that there are economies of scale (only moderate) in the Indian manufacturing industries and it has been exploited after the key economic reforms in 1991. Their study also revealed that there is a biased technology change and majority of the industries have experienced capital-using technical change.

Chattopadhyay (2004) examined and analysed the trends in TFP of manufacturing sector in West Bengal. The paper examined the overall industrial scenario of West Bengal for the past three decades. He studied the productivity of capital and labours for the two digit industry groups and the TFP of manufacturing sector of West Bengal as a whole vis-à-vis all India, and for some other selected groups of industries for West Bengal using ASI data. The study revealed that the state of West Bengal lost its earlier status of one of the highly industrialized state of the country. Its share to all India net value added, share of employment and factories has
come down drastically. Profitability of total manufacturing sector has gonedown. Productivity of the capital of the manufacturing sector has declined, while labour productivity has increased. However, the latter has increased mainly due to a few industry groups, which are highly capital intensive and have contributed around 85 per cent of the profit of total manufacturing sector. The total factor productivity (TFP) of West Bengal’s manufacturing sector as a whole has been declining, while it has been increasing in case of India. The TFP of six industry groups, which played a dominant role during the early 1960s, has gone down except jute industry, which itself is a dying industry. That means no new industry groups have come up to take up the position of these industries.

Uma Rani, Jeemol and Unni (2004), observed a sharp growth in capital intensity (declining labour intensity) in both the organized and unorganized sectors. The positive growth in capital intensity was not accompanied by a rise in Capital productivity in both sectors, which again implied a substitution of capital for labour, without any technological upgradation, across all industry groups at 2-digit level in both the sectors.

Kumar (2006) attempts to estimate the trends in growth of total factor productivity of Indian chemical industries at the sub sectoral level. The study covered the period of 22 years from 1980-81 to 2001-02. The entire period is divided into two phases as pre-reform period (1980-81 to 1990-91) and post-reform period (1991-92 to 2001-02). The total factor productivity growth (TFPG) is estimated using Translog model with three inputs, viz. labour, capital and the intermediate inputs, raw materials consumed. The factor productivity growth rates were computed for the five major sub sectors of Indian chemical industries. The results showed that the impact of economic reforms on the productivity levels of an industry at the aggregate and sub-sectors level do vary significantly. While the net impart of the reforms process on total factor productivity growth was found to be poor at the aggregate level. The sectors: drugs and pharmaceutical, paints and vanishes, basic chemical and dyes and dyes stuff industries greatly benefited from the liberalization process. Within the sub sectors, the worst affected was the fertilizer industry as the TFPG declined significantly in the post-reform period. Results further showed that the productivity differentials were found at firm level.
Sidhu (2007) conducted a study at aggregated and disaggregated levels for manufacturing sector for the period 1973-74 to 2002-03. The study was based on the statistics of Annual Survey of Industries using growth accounting method to measure total factor productivity. Results at the aggregated level revealed that growth in productivity was discouraging during 1973-83; there was some increase in the growth during 1983-93 and slump during the 1993-2003 period. However, at disaggregated level, the performance of the industry has varied widely within as well as across the states. There was a sharp decline in the growth of industrially developed state of Maharashtra after the reforms period while the state of Haryana showed improvements. Also, the state of Orissa, which was industrially backward, showed improvement in the reforms period.

Ruhul A Aalim (2007), in his reviewed work titled “Explaining the Differences in Firm Level Production Capacity Realization in Bangladesh Food Manufacturing: A Panel Data Study to examined the impact of a set of firm-specific and policy related variables such as size, age, ownership and effective rate of assistance on the rate of production capacity realization (PCR) of firms. This study uses a panel of 92 food manufacturing firms of Bangladesh over the periods 1992-1994 and 1997-1999. Firm size is found to have positive impact while capital intensity and age of firm have negative impact on PCR at the firm level. The striking result is that the policy related variables such as the effective rate of assistance (ERA) and outward orientation (OPN) do not have any significant impact on PCR. These results were also confirmed by the extensive test of sensitivity analysis. The insignificance of ERA and OPN may be attributed to piecemeal and partial nature of policy reforms. His results suggests the need for further reform of trade policies, in particular, focusing on reducing nominal and effective protection levels in order to enhance competition and competitiveness so that an efficient production can take a firmer root in the industrial sector of the economy.

Sudip Chaudhuri (2013) in his study “Manufacturing Trade Deficit and Industrial Policy in India” revealed that the manufacturing trade balance in India did not worsen after the economic reforms started in 1991. This was because of the successful growth of industries such as pharmaceuticals, which the earlier planning strategy helped to develop. The reforms changed in favour of capital goods such as aircraft and new types of telecom equipment, but the manufacturing base did not
respond appropriately. Reforms did not help the domestic manufacturing of these goods. Opportunities arising out of reforms could not be exploited by domestic manufacturers of these industries due to lack of acquisition and development of capabilities which arises from economic reforms.

**Fatma Douruel and A. Suut Dogrue** in their paper titled “Openness and Regional Distribution of Turkish Manufacturing Industries”, on the effects of the trade liberalization in Turkey on the spatial distribution of the manufacturing industries at the three-digit ISIC level. In order to measure the regional distribution of the industrial activities they calculated coefficients of variation for annual value added and employment. Their study revealed that trade liberalization do not create systematic change in the spatial distribution of the manufacturing industries.

**John R. Baldwin and Wulong Gu** in their paper titled “Export-Market Participation and Productivity Performance in Canadian Manufacturing”, explore the linkages between export-market participation and productivity performance in Canadian manufacturing plants. They also examine differences in the relationship between exporting and productivity for foreign-controlled as opposed to domestic-controlled plants, and between younger and older plants. Export participation is associated with improved productivity. The effect is much stronger for domestic-controlled plants than for foreign-controlled plants and for younger businesses than for older businesses. They interpret this as evidence that there is a learning effect associated with export activity but that the potential for improving productivity with entry to export markets differs across firms.

**Par hansson and Nan Nan ludin** in their paper titled “Export as an on or Promoter of Successful Swedish manufacturing Firms in the 1990” studied the link between exports and productivity at the firm level. Like in previous studies they got support for the hypothesis that, more productive firms self select into the export market. In addition, and contrary to many of the former studies, they also obtained evidence that exporting further increases firm productivity. Exporting firms appear to have significantly higher productivity than nonexporting. Moreover, exporters firms that increase their export intensities have higher output growth than nonexporters. Reallocation of resources between firms may then have contributed to overall manufacturing productivity growth.
Taegi Kim and Changush Park Chonnam in their paper titled “R&D, Trade, and Productivity Growth in Korean Manufacturing,” investigate the effect of both R&D spillovers and trade patterns on productivity in Korean manufacturing, using industry-level data. The results show that domestic and foreign R&D capital stocks played an important role in the productivity growth of Korean manufacturing over the period 1976-96, and that foreign R&D capital had more effect than domestic R&D in improving the total factor productivity of Korean manufacturing. Moreover, productivity is higher in export industries and the more open industries, and the effects of foreign R&D capital are stronger in the industries with large import shares or large intra-industry trade shares.

Section V
2.5 Studies Pertaining to Small Scale Industry

Jain (2004) analysed the growth of small scale sector, government policy towards small scale sector along with problems faced by them due to globalisation in the pre- and post-liberalisation periods. Since small scale industry constitutes a very important segment of Indian economy and has emerged as a dynamic and vibrant sector of the economy, new policy initiatives since 1991 by the government caused a shift in focus from protection to promotion. Before the introduction of economic reforms the small scale sector was protected and with globalisation this sector is exposed to severe competition both from domestic and foreign firms. In the post-reform period the government took a number of steps including partial de-reservation, change in investment limits, and facilities for foreign participation, establishment of growth centers, marketing assistance and incentives for quality improvements. The study reveals that the problems of small scale sector are multi-dimensional especially in the liberalized environment which would further be intensified with the arrival of multinational companies and removal of quota restrictions in the textile sector. In this context, the study suggests that the government should give priority to the timely and adequate loans to the small scale industries along with time-bound promotional concessions, upgradation of technology, marketing assistance through vigorous research and development efforts.

Nikaido (2004) attempted to present some policy implications for the better development of small scale industrial sector which after the liberalisation of Indian
economy in 1991, SSI sector was recognized as a engine of growth. The technical efficiency of this sector was measured by using a stochastic production frontier model. The impact of firm size and geographical agglomeration on the measured technical efficiency was also examined in the study. The industry state wise data for this study were drawn from the second all India census of small scale units, published by development commissioner (SSI) in 1992. Variables such as production, employment, fixed investment, capacity utilisation and the number of units were used. It was observed that due to competition with large industries and foreign firms, small scale industry did have the incentive to grow into larger units and therefore ignored the quality of its goods. Moreover, agglomeration of firms was found to be positively affecting the measure of technical efficiency, while the firm size had a negative effect on it. Thus, the supporting policy itself might have prevented the potential capacity and innovative nature of small scale industrial sector. It was suggested that for the promotion of clusters, the government needs to support infrastructure around clusters and technological upgrading. Moreover, promotion of links with external agents like buyers and export traders can provide management know how, improved designs and new techniques for the better development of small scale industrial units.

Latha (2005) highlighted that small scale sector has acquired a prominent place in the socio-economic development of the country during the last five decades. It has been assigned an important place commensurate with its potential for employment generation, dispersal of industry in rural areas and export promotion. In this context, small scale sector can be termed as a nursery of economic development. To overcome the problems of small scale sector, government must provide additional facilities, schemes, incentives and encourage innovative activities of entrepreneurs for the development of SSI sector in the era of globalisation.

Mishra (2006) in his study highlighted the working of small scale industries in Orissa during the year 1996-97 the 1998-99 and in the year 2003-04. The period witnessed policy changes at different level, which might have affected the working of manufacturing sector in general and manufacturing small scale industrial units in particular. The study is based on two benchmark studies conducted on the performance of the small scale industrial manufacturing units in five small industrial clusters in Orissa. The performance of small scale industrial units has been assessed by fitting the Cobb-Douglas production function for four financial years. Most of the
units taken were raw material intensive and a few labour intensive depending upon the type of product categories. It was observed that no significant growth took place in the factor productivity in any of the product categories over the two periods of time. The incidence of closure of these units in Orissa was found to be very high. The main reasons for the sickness and closure of small scale industries in the state were lack of demand, tax problem, and competition in local markets, financial problems and attitude of the entrepreneurs. The study suggested that a bottom up approach is needed to bring an attitudinal change among the entrepreneurs in the state and which will also help in the identification, assessment and promotion of small scale units. These small scale units will then use the local resources and will have strong linkages with the local and outside markets. This would make the small units sustainable and would help positively for their further development, in a state like Orissa.

Suresh and Shashidhar (2009) they were conducted a study which focused on the importance of small scale industries and their role in the economy and the impact of economic reforms on the growth performance of small scale industrial sector. It was observed that a significant contribution was made by this sector in employment generation as well as rural industrialization. It was also noted that under the changing economic scenario, the small scale sector has the opportunities to explore as well as challenges to face. The opportunities can be explored through cost effectiveness, improving quality of the product and diversifying the production process. However, the challenges can be confronted by enhancing competitiveness at both intra- and international levels. The intra-national competition has come from the large industrial sector whereas the international competition is to be faced from the large multinational corporations.

It may be observed from the above reviewed studies that most of the work relate to the overall Indian manufacturing sector and comparatively slight attention has been paid to evaluate the production structure, efficiency and levels of technical progress in Indian manufacturing sector during reform period.

2.6 Research Gap

The evidence from these various empirical studies using different techniques and data sets do not support the common opinion regarding economic reforms and performance of organised manufacturing industries. While some of the empirical
studies ultimately find the evidence to support the view that these reforms have strengthened the industrial performance; some studies establish an inverse relationship between economic reforms and industrial performance; and some studies advocate no relationship between reforms and industrial growth. Moreover none of these studies has compared and analyzed the performance between labour intensive and capital intensive organised manufacturing industries in India.

Many of the earlier Indian studies on industries have not considered the sources of changes in the productivity growth. In the traditional methodology of estimating Total Factor Productivity Growth (TFPG), the sources of Total Factor Productivity Growth were ignored.¹⁵ To fill this gap the present study attempts to employ a non parametric approach Data Envelopment Analysis (DEA) to estimate Total Factor Productivity Change and its sources during economic reforms by classifying the Selected Indian Organised Manufacturing Industries into Labour and Capital Intensive Industries to know whether both type of industries derived equal benefits from economic reforms or not. And also the evidence from previous studies reveals that after liberalization of the economy, the growth of the overall employment in the manufacturing sector has declined. However, not all sectors experienced a decline in employment during the period of the policy change. So another important objective of the present study is to examine the determinants of employment and structural growth in selected labour intensive and capital intensive organised manufacturing industries in India during economic reforms. And present study made an attempt to consider to 4digit Indian organised manufacturing industries and most of the studies have come out with the results using short period data. The present studies hence consider a relatively longer period of data.

2.7 Research Issues

Opening up of Indian economy provided greater autonomy to private enterprises to take their own decisions regarding their industrial activities for increasing efficiency, competitiveness, productivity, international market expansion and growth of the country GDP. In this context the present research tries to find out whether there is any significant difference in the performance of selected Indian organised manufacturing industries by classifying them into in to labour intensive and

capital intensive industries. Further, the study tries to examine the impact of economic reforms on the performance of both types of selected organised manufacturing industries in India.

2.8 Conceptual framework

The above conceptual framework diagram represents how country’s economic reforms provide an opportunity to organised manufacturing industries for increasing their performance through increasing total factor productivity, output, employment, export and GDP.

Productivity growth in organised manufacturing industries is necessary not only to increase output, but also to enhance the competitiveness of an industry both in the domestic and international markets. Besides, productivity growth enhances the export competitiveness of a country. The estimation of factor production will be very useful to evaluate the variations in the performance of an industry over a period of time. The prosperity of a nation can be attributing mainly to the sustained growth of
their total factor productivity, sources of productivity growth, level of labour absorption and technical efficiency.

The process of liberalization can be linked to the manufacturing productivity. The Indian government started to implement a wide range of economic reforms on various fronts to make domestic industries more efficient and internationally competitive. Indian industries were expected to respond positively to these measures. The liberalization process was to expose domestic industries to international competition and force them to introduce new methods of production, import quality inputs, capital equipment or technology and compel them to improve their efficiency. Hence the present study would be made an attempt to analyze the performance of organised manufacturing industries by classifying them into labour intensive and capital intensive industries by estimate the key variables of Total factor Productivity Growth, Sources of Productivity Growth, Determinants of Employment and Technical Inefficiency.

2.9 Objectives of the study

Present study is based on the following objectives:

1) To analyse the comparative changes in the structure and performance of Indian organised manufacturing industries during pre and post reform period.

2) To examine economic reforms and sources of productivity growth in selected organised manufacturing Labour Intensive and Capital Intensive Industries in India.

3) To analyse the impact of economic reforms and determinants of employment in selected organised manufacturing Labour Intensive and Capital Intensive industries in India during reform period.

4) To evaluate individual industries’ efficiency trends and their technical coefficients in selected Labour Intensive Industries and Capital Intensive industries.

2.10 Hypotheses

Based on the above objectives the following hypotheses are formulated:

1) There is no difference in the capital intensity of pre and post reforms period in Indian organised manufacturing sector.
2) Economic reforms positively influence Total Factor Productivity in selected capital intensive industries.

3) Economic reforms influence Total Factor Productivity negatively in selected labour intensive industries.

4) There is reduction in employment in both capital and labour intensive industries during the reforms period.

5) Technical inefficiency is only found only in labour intensive industries.

2.11 Data and Methodology

Methodology has been discussed in detail in the respective chapters. This part briefly explains the methodology which the study has employed. The study is based on panel data of Annual Survey of Industries (ASI), collected from Centre for Monitoring Indian Economy (CMIE), Industry Outlook, Central Statistical Organization (CSO), Ministry of Statistics and Program Implementation, Government of India, New Delhi and Index numbers collected from Ministry of Commerce and Industry, Department of Industrial Policy and Promotion, for the period of 22 years from 1990-91 to 2011-12. L/K labour intensity ratio was used to classify the selected organised manufacturing industries into labour intensive and capital intensive industries. The study converted nominal gross value of output to real one and the annual current value has been deflated by wholesale price index (WPI) of manufacturing product (Base 2004-05=100). WPI for all manufactured product has been used as a proxy. The number of workers are considered as a employment variable, real fixed capital was deflated by price index of machinery and machine tool products (base 2004-05=100) using machine and machine tool product index as a proxy. For converting nominal wages to worker into real wages to worker, annual value has deflated by Consumer Price Index of Industrial Worker (CPIIW) (base 2001=100), where General CPII IW were considered as a proxy. Study adopted analytical, descriptive and econometric techniques like data envelopment analysis (DEA) for measuring total factor productivity growth and panel fixed effect and random effect models are used in both selected organised manufacturing labour intensive and capital intensive industries in India. Dummy variable technique has also been used to testing hypothesis. Statistical tools like, tables and graphs have helped on analyzing and interpreting the collected statistical information.
2.12 Classification of Indian Organized Manufacturing Sector into Labour Intensive and Capital Intensive Industries

The study used the National Industrial Classification (NIC2004) at a disaggregate 4-digit level in order to assess the Labour Intensity and Capital Intensity of the Organised Manufacturing Sector.\textsuperscript{16} The time period chosen for the study is from 1990-91 to 2011-12. The 4-digit industries are spread across the 23, 2-digit divisions 15 to 37 (see appendix1 and appendix 4 for details). These 23 divisions constitute the entire manufacturing sector of India. All the 141 4-digit industries of the NIC 2004 classification in the organized manufacturing sector were considered. However to build a continuous time series at NIC 2004, we had to merge as well as delete some 4-digit industries. These 4-digit industries belong to the organized manufacturing sector, as documented in the Annual Survey of Industries (Central Statistical Organization, Government of India).

For examining productivity performance growth in Indian Organised Manufacturing Industries, industries were classified as Labour Intensive and Capital Intensive industries. For identifying Labour Intensive and Capital Intensive Industries, the labour-Capital ratio (L/K) ratio for all industries for every year, and for each industry an average (L/K) ratio was calculated for the period 1990-91 to 2011-12. The average (L/K) ratio for all industries together was found to be 5.40. All the industries with average (L/K) ratio greater than 5.40 were considered as Labour Intensive Industries and all those industries with a ratio less than 5.40 were labelled as Capital Intensive Industries. Ten industries from Labour Intensive segment and ten industries from Capital Intensive segment were selected. The share of total value added and export contribution was considered for selecting industries for analysis which represent competitive ability of the selected industries.

2.13 Industries Selected for Analysis

On the basis of above procedure the following industries have been selected for analysis. Names of Selected Organised Manufacturing Labour Intensive Industries and Capital Intensive Industries are given in table2.1 and table2.2, with respective National Industrial Classification (NIC-2004) industry codes.

\textsuperscript{16} Organised manufacturing industries comprise those industrial units which are registered as ‘factories’, i.e., they employ 10 or more workers with power or 20 or more workers without power.
Table 2.1: Selected 4-digit Organised Manufacturing Labour Intensive Industries NIC-2004

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Industry Code NIC 2004</th>
<th>Name of The Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1730</td>
<td>Knitted and Crocheted Fabrics</td>
</tr>
<tr>
<td>2</td>
<td>1723</td>
<td>Cordage, Rope, Twine and Netting</td>
</tr>
<tr>
<td>3</td>
<td>1810</td>
<td>Wearing Apparel, Except Fur Apparel</td>
</tr>
<tr>
<td>4</td>
<td>1729</td>
<td>Other Textiles N.e.c.</td>
</tr>
<tr>
<td>5</td>
<td>1912</td>
<td>Luggage, Handbags and the Like, Saddlery &amp;Harness</td>
</tr>
<tr>
<td>6</td>
<td>1920</td>
<td>Footwear</td>
</tr>
<tr>
<td>7</td>
<td>3610</td>
<td>Furniture</td>
</tr>
<tr>
<td>8</td>
<td>2811</td>
<td>Structural Metal Products</td>
</tr>
<tr>
<td>9</td>
<td>3691</td>
<td>Jewellery and Related Articles</td>
</tr>
<tr>
<td>10</td>
<td>3592</td>
<td>Bicycles and Invalid Carriages</td>
</tr>
</tbody>
</table>


Table 2.2: Selected 4-digit Organised Manufacturing Capital Intensive Industries NIC-2004

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Industry Code NIC 2004</th>
<th>Name of The Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2511</td>
<td>Rubber Tyres and Tubes; Retreading and Rebuilding of Rubber Tyres</td>
</tr>
<tr>
<td>2</td>
<td>2320</td>
<td>Refined Petroleum Products</td>
</tr>
<tr>
<td>3</td>
<td>2710</td>
<td>Basic Iron and Steel</td>
</tr>
<tr>
<td>4</td>
<td>2720</td>
<td>Basic Precious and Other Non-ferrous Metals</td>
</tr>
<tr>
<td>5</td>
<td>2411</td>
<td>Basic Chemicals</td>
</tr>
<tr>
<td>6</td>
<td>3530</td>
<td>Air and Spacecraft and Related Machinery</td>
</tr>
<tr>
<td>7</td>
<td>3591</td>
<td>Motorcycles</td>
</tr>
<tr>
<td>8</td>
<td>2926</td>
<td>Agricultural and Forestry Machinery</td>
</tr>
<tr>
<td>9</td>
<td>2921</td>
<td>Machinery For Textile, Apparel and Leather Production</td>
</tr>
<tr>
<td>10</td>
<td>3110+3120</td>
<td>Electric Motors, Generators, Transformers and Electricity Distribution and Control Apparatus</td>
</tr>
</tbody>
</table>

2.14 Organisation of the Study

The entire study has been divided into seven chapters.

Chapter 1 on “Introduction” includes introduction to the present study; importance of manufacturing in economic development; Theoretical Framework and Empirical Evidence deals with aspects, which provide theoretical base for the present study and the contributions of economists who have tried to establish the need for industrialization for promoting development in developing countries, are discussed.

Chapter 2 of the study is on review of literature which helps to find the research gap in the area; the need for the present research work; purpose of the present study; objective of the study; hypothesis; methodology; data source for present work; Classification of Labour Intensive and Capital Intensive Industries and industries selected for analysis. It also includes chapter contents of the research work in brief.

Chapter 3 discussed about Structure and Performance of Indian Organised Manufacturing Industries during Pre and Post Reform Period.

Chapter 4 studies about Economic Reforms and Sources of Productivity Growth in Selected Organised Manufacturing Labour Intensive and Capital Intensive Industries in India.

Chapter 5 deals with economic reforms and determinants of employment in selected organised manufacturing labour intensive and capital intensive industries in India.

Chapter 6 investigates the economic reform and efficiency trends in selected organised manufacturing labour intensive and capital intensive industries in India.

Chapter 7 provides summary of findings and concluding remarks.