CHAPTER- 1

INTRODUCTION

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1.1. General Background:

Steel is crucial to the development of modern economy and is considered to be the backbone of the human civilisation. The level of steel production is one of the indicators of a country's economic development. The condition of steel industry is the barometer of industrial health of the nation. The level of per capita consumption of steel is treated as one of the important indicators of socio-economic development and living standard of the people in any country. It is the product of a large & technologically complex industry having strong forward and backward linkage effects which form the nucleus around which develops the various interdependent sectors of its expanding economy. All the major industrial economics are characterised by the existence of a strong steel industry and the growth of these economies has been largely shaped by the strength of their steel industries in their initial stages of development.

The modern steel industry in India started with the establishment of the TATA IRON & STEEL COMPANY in 1911. Before independence, India had only three steel plants jointly producing a meagre 1.3 mt of steel. Soon after independence, three major integrated steel plants were built with the aim of industrialisation & rapid economic growth in the country. Since then the Indian steel industry has grown to become the eighth largest producer of crude steel in the world today. However, steel industry operated in a favourable business environment in the first forty years of its existence in independent India. It developed steadily in a protected environment. The industry was under strict Government regulation. Setting up a steel industry required licenses from the Government. There was strict control over imports. As a result there was hardly any competition. The production, price, & distribution were regulated. While the Govt. was the major purchaser, others had difficulties in fulfilling their requirement of steel. The steel industry was in a totally seller's market.

But in a very hot summer of 1991, the then Finance Minister of Govt. of India, Dr. Manmohon Singh announced the New Economic Policies (NEP) of
India. There was a great change in the economic policy of the country. The NEP was announced as a cure for Indian Economic Crisis. At that time Indian economy was facing economic hurdles. One of the several problems was very huge BOP deficits and growing external debt to International Financial Institution & countries. The financial institutions refused to provide support and insisted of some stringent conditions regarding change of economic policies to the debtor countries. These conditions are known as Economic Liberalisation / Globalisation, Economic Stabilisation, and Structural Adjustment Programmes. Out of these, liberalisation is a significant element of NEP based on the economic philosophy that the role of the state in economic activity should be limited as the state is not in a position to finance its growing economic activities. For example, during 1990-91, credibility of India was very low. The country was running a current account deficit of around $ 10 billion. Reserve was sufficient for two weeks imports only. The IMF loan was about $ 1.8 billion in January 1991. Commercial borrowing was impossible. Inflation was running at an annual rate of 13 %. Under this situation, Indian Government adopted a policy of liberalisation.

The NEP brought about radical changes in the economic policies of the country. Simultaneously, the Indian steel industry were facing serious challenges arising out of this new competitive environment due to opening up of steel sector and its sudden exposure to the world steel market. The domestic steel market has radically been transformed from a seller's market to a buyer's market. The process of liberalisation has definite impact on the Indian economy. But it is debatable as to how far the Indian steel industry has been affected by the liberalisation policy in different sections of the industry within this liberalised period whether the growth & development of steel industry have actually fulfilled the mission of liberalisation.
1.2. Objective of the Study:

It is a matter of fact that, the effect of any policy/policies is not uniform in all the sector of the economy. And it is not possible to analyse the overall impact of the policies in the entire economy in the same study. The main objective of this study is to find out the impact of the new economic policies popularly known as liberalisation policies on Indian steel industry. Within a decade after adopting the liberalised policies Indian steel industry has passed through severe ups and downs, which creates confusion regarding the effect of liberalisation. Economists, Politicians, Bureaucrats have given their views from their own thinking and analysis. But a detailed analysis is still lacking. So, a detailed analysis of liberalisation policies on domestic steel sectors seems to be imperative. Moreover this study will consider the development and progress of the different aspects of steel sector like production, consumption, import, export, comparative advantages etc. in the post-liberalisation regime and made a comparative study with pre-liberalisation regime and global steel sector as well.

In this context, the main objectives of this study are,

1. Whether production and consumption aspect in the post-liberalisation regime have registered significant progress compared to the pre-liberalisation regime.
2. Whether there has been a transformation in the steel industry from sellers market to buyers market.
3. Whether the domestic producers enjoyed the comparative advantage in the post-liberalisation period.
4. How the steel imports and exports are affected by the liberalised policies.
5. Whether there have been significant gains in the productivity, efficiency and related issues in the post-liberalisation period compared to pre-liberalisation period.
1.3. Hypothesis to be tested

Hypothesis is considered to be sine qua non in research. A hypothesis states what we are looking for and it is expressed in the form of a proposition which can be put to a test to determine its validity. Liberalisation policies have been adapted to overcome the economic crisis of late eighties. So it was very much expected that economic liberalisation will definitely accelerate the economic growth of our country. Steel being a core sector of the economy positively show a radical changes. This comprehensive analysis consists of the following hypothesis:

- Production and consumption will show a steady and positive growth rate in the liberalisation regime.
- Due to abolition of licensing the green field units are expected to enter and play the leadership role in the industry.
- Liberalisation policies transform the steel industry from sellers market to buyers market.
- Reduction of custom duty, open general licensing etc. expected to help the domestic producers to export more and import the state of art technology and those products which are not available domestically.
- Factor productivity and factor efficiency have improved in the post-liberalisation phase.
- Verdoons law is validated.

1.4. Framework and Methodology of the Study

Regarding the framework, the core of the study consists of ten chapters in a coherent manner. Chapter 1 is an Introduction, presenting a general background of this study, objective of this study with relevant hypothesis, time frame, data sources and a brief review of the existing study regarding the multidimensional analysis of steel industry.

Chapter 2 attempts to highlight the historical prospective of Indian steel industry including ancient development, developments in nineteenth and twentieth century. Chapter 3 mentioned the background behind adopting the new economic policies, the features of the policies specifically which affect the Indian steel industry.
Chapter 4 highlight the immediate attempt taken by the domestic producers to adopt the economic liberalisation, i.e. massive modernisation programme as well as entry of several secondary producers due to abolition of licensing. Chapter 5 attempts to identify the impact of those new economic policies which are popularly known as liberalisation policies on Indian steel industry. This chapter analyses production performance of Indian steel industry in the post liberalisation regime and a comparative study between pre liberalisation regime as well as global steel scenario.

It goes without saying that the consumptions of steel are the important indicator of economic development. So, with the study of production, an analysis of consumption pattern is also very essential. In view of this, in Chapter 6, an attempt has been made to examine how the consumption pattern has changed in the post-liberalisation regime as well as the trend of per capita steel consumption which is one of the indicators of economic development. More attempts have been made to examine the changing pattern of consumption elasticity with GDP.

As Government has adopted liberalised EXIM policy, so to examine the Growth trend of export-import is very much essential. In Chapter 7 an attempt has been made to analysis the export and import of steel in India in the post-liberalisation period. India is enjoying comparative advantages of cheapest raw materials and work forces in steel making in the world. Chapter 8 containing the analytical view of comparative advantage of Indian steel sector with the strategies of comparative advantage, suggested measures, techno economic improvement and sensitivity of steel demand to price.

In Chapter 9 attempts has been made to go through econometric model analysis, containing analyses of partial factor productivity, total factor productivity, efficiencies of factor and verification of Transcendental Logarithmic specification and Validity of Verdoorn law.

No research work is completed until and unless positive and constructive suggestive measures are introduced on the basis of the complete research analyses. In Chapter 10 that attempt has been made. Certain strategies are suggested to strengthen the Indian steel sector, which broadly segregated as Short run and Long run strategies.
More over few strategic reinforcement are suggested which definitely give impetus to the Indian steel industry in this acceleration stage. Finally an attempt has been made to present a conclusive remark.

The Final Chapter e.g. Chapter 11 containing the bibliography in which the name of the books and articles are mentioned which helps me a lot to complete this research work.

**Methodology of the study:**

The Statistical tools employed in this analysis are simple and straight forward. I considered Productivity growth, which is the basis of efficient economic growth. Economic growth has been defined as the process of a sustained increase in the production of goods and services with the aim of making available a progressively diversified basket of consumption goods to population.

Productivity growth in the manufacturing sector in general and steel industries in particular has the effect of modernisation. The degree of this modernisation of course depends on magnitude and the nature of technological change. If technological change is neutral, in the sense that it affects all inputs equally, the degree of modernisation will depend on the overall growth of technological progress.

Productivity growth is crucially affected by technological change. Their relationship is so close that the two terms often tend to be used interchangeably. Productivity is a wider concept. Even though a crucial one, technological change is only one of the many factors which affect productivity growth.

To examine the productivity growth, analysis of single and total factor productivity is considered. The partial or single factor productivity (PP) of labour or capital is indicated by the ratio $Y/L$, or $Y/K$ i.e. output per unit, or the average product of the factor concerned. The productivity defined this way is merely the inverse of factor intensity.
Total factor productivity (TFP) extends the concept of single factor productivity such as output per unit labour or capital to more than one factor. Thus TFP is the ratio of gross output to a weighted combination of inputs. For the case of production function shown above, TFP at time \( t \) would be given by:

\[ A_t = \frac{Y_t}{g[\alpha K_t, \beta L_t]} \]

Here I have used another three principal approaches to measures the productivity growth, which are: (i) The index number approach, (ii) Parametric approach and (iii) Non-parametric approach.

**Index Number Approach**

In this approach the observed growth in output is sought to be explained in terms of growth in factor inputs. The unexplained part or the residual is attributed to growth in productivity of factors. It consists in assuming a certain functional form for the producers' production function and then deriving an index number formula that is consistent (exact) with the assumed functional form. Preferred functional forms are the flexible ones. These indices differ from each other on the basis of underlying production function or the aggregation scheme assumed. Following indexes are used in this study.

- Kendrick Index
- Solow Index
- Translog Index

**Parametric Approach**

Parametric approach consists in econometric estimation of production functions to infer contributions of different factors and of an autonomous increase in production over time, independent of inputs. This latter increase, which is a shift over time in the production function, can be more properly identified as technological progress. It is one of the factors underlying productivity growth. An alternative to estimation of production functions is estimation of cost functions using results from the duality theory. These are the commonly used specifications of production functions.
Cobb-Douglas Specification

Constant Elasticity of Substitution (CES) Specification

Transcendental Logarithmic (TL) Specification

In Transcendental Logarithmic Production Function specification, the elasticity of output with respect to input and capital are not constant as in Cobb-Douglas production function. The elasticity of output of each variable is:

\[
\frac{\partial \log Q}{\partial \log X_i} = \alpha_i + \sum \beta_{ij} \log X_j + \beta_t t
\]

Finally, in this study attempts have been made to verify the Verdoorn law with Kaldor's and Rowthorn's specification. Kaldor specifies the aggregate Verdoorn law as a regression equation as –

\[
\begin{align*}
\dot{LP} &= f(Q) \\
\dot{LP} &= \alpha_1 + \beta_1 \dot{Q}
\end{align*}
\]

Where, \(\dot{LP}\) and \(\dot{Q}\) are the growth rate of labour productivity and output.

But Rowthorn's specifies the aggregate Verdoorn's Law as:

\[
\begin{align*}
\dot{LP} &= f(L) \\
\dot{LP} &= \alpha_2 + \beta_2 \dot{L}
\end{align*}
\]

Where \(\dot{LP}\) and \(\dot{L}\) are the growth rate of labour productivity and employment.

This study has been done on the basis of the above formulas and methods.

1.4. TIME FRAME:

The analysis is a comparative as well as prospective study of Indian steel industry before and after economic liberalisation. Liberalisation policy has been adopted in the year 1991-92. Twelve (1980-81 to 1991-9) years has been considered as Pre-liberalisation regime and 1992-93 to 2003-04 as Post-liberalisation regime.
1.6. **DATA SOURCE:**

(i) Ministry of Steel  
(ii) Joint Plant Committee  
(iii) World Steel Dynamic  
(iv) IDBI Report  
(v) Centre for Monitoring Indian Economy's Report  
(vi) World Steel.com  
(vii) Infoline.com  
(viii) R.B.I. Bulletin  
(ix) Annual Survey of Industries

1.7. **Literature Survey:**

After the starting of liberalisation process in India, economists, politicians, scholars and bureaucrats spent few years to observe the effect and direction of the reform process on Indian economy. After few years, they put their mind to analyse the effect. However, meanwhile several articles have been written by several renounced personalities on their prediction or projection from short-term experience. I found several articles on this issue. Several scholars in different sectors of the economy have done analytical research work. Nevertheless, I have not found any analytical & comparative research work on steel industry and the impact of liberalization on it.

The first book was published by Prof. S. Shiva Ramu of IIM, Bangalore, titled as “GLOBALISATION – The Indian Scenario”, in which he concentrated on the study of the effects of liberalization policy and the response of the big, medium and emerging groups of industries through restructuring, product mixing, and policy changes. He has pointed out the changing pattern of public sector enterprises and multinational enterprises in the liberalised regime. He explained the changes of different industries of the economy in very brief like Textile, Pharmacy, Automobile,
Food & Beverage, Computer & Software, Engineering, Construction, Leather, Paints, Fireworks, Pencil, hopes Media & Steel industry. In his writing, he has given very brief information in on exports, consortium, joint ventures & acquisitions of steel sector in the post – liberalization era.

Mr. P. K. Sinha, Ex-Secretary, Ministry of Industry, Govt. of India and Mr. S. C. Suri, Former Executive Director, SAIL with their extensive experience, published a book titled as “INDIAN STEEL PERSPECTIVE 2025” in the year 2003 under Centre for policy Research, New Delhi. In this book they had made an attempt for an in-depth analysis of existing and futuristic prognosis for the world and Indian Steel Scenario and effects of globalisation, technical developments, availability of raw materials, metallic balance, threats posed by substitute materials, global competitiveness, pricing, mergers and acquisition etc. Econometric model and tools were used to forecast demand estimates for the short and medium term. In addition, an indicative assessment for the long term (2025) has been made. Finally they have tried to attempt to draw up policy prescriptions for the government industry and financial institutions.

According to them, the Indian Steel Industry was in a spin, notwithstanding the numerous rosy forecasts and scenario built by several experts in the past. Despite liberalization and the reforms set in motion in 1991, the steel industry had not done well. Financial institutions that had lent huge sums of money to Indian entrepreneurs to set up steel making facilities in the country were bemoaning their lot as demand and profitability failed to materialize. Their exposure to the steel sector was threatening their viability. Some thing had gone amiss, and the need to understand the cases of these slippages could not have been more urgent. It was generally felt that the political economy of the country had a lot to with the fortunes of the Indian Steel industry than hither to acknowledge.

S.Mitra Majumder, faculty member of R & D centre for Iron & Steel and T. Ghoshal, faculty of Management Training Institute, SAIL, Ranchi, jointly published an article “Strategies for Sustainable Turnaround of Indian Steel Industry” in the year 2003, after observing several ups & downs in the industry. Their attempt to develop a strategy for sustaining Indian steel industry is really a very resourceful combination of
theoretical, practical and analytical one. In their own word, “The challenges that confront Indian steel industry in the age of globalisation are complex in nature. The secret of sustainable turnaround lies in how Indian steel industry faces the challenges and develops combative and anticipatory prowess. Problems and solutions may vary with organisations but there is more a commonality than initially meets the eye. A two-step strategy is suggested for the sustainable turnaround in the industry. These stages, aimed to ensure survival and growth have been termed survival strategy and growth strategy. The survival strategy provides a foundation upon which a potent growth strategy could be formulated. While the survival strategy would ensure the survival of the ailing steel industry, the growth strategy would simultaneously take care of its total transformation towards a better future. Both stages, to be implemented through an integrated plan, are essential to enable the industry overcome the present imbroglio”.

In their article, they have analysed the performance of steel sector form 1992-93 to 2002-03 in different aspects like demand-supply, share price movement, debt movement of equity ratio, return of net worth etc. At the same time, very carefully they have identified the major problems I the industry as well as the strengths i.e. comparative advantages of Indian steel sector. Finally they prescribed certain strategies for turnaround which are very systematic & scientific. Finally they concluded in their own language, “Ultimately strategies will viable if the business is managed to achieve that viability. Experience suggests that the industry today remains predominantly technically and production driven. This must change. Today steel industry operates at high levels business complexity. Today there is need that they eliminate all unnecessary complexity and focus on selected products and markets to achieve as in many other industries.”

Industrial Development Bank of India (IDBI) has gone through a sectarian study on Indian steel industry in the year 2000. In which the experts of IDBI analysed the growth trend of steel production and on the basis of that experience they prepared projection of demand for finished steel for ninth and tenth plan periods. They also analysed the financial performance as well as competitive position of the Indian steel industry and SWOT analysis.
Katja Schumacher and Jayant Sathaye have published an article entitled, “India's Iron and Steel Industry: Productivity, Energy Efficiency and Carbon Emissions” in October 1998. According to them historical estimates of productivity growth in India's iron and steel sector vary from indicating an improvement to a decline in the sector's productivity. The variance may be traced to the time period of study, source of data for analysis, and type of indices and econometric specifications used for reporting productivity growth. They derive both growth accounting and econometric estimates of productivity growth for this sector. Their results show that over the observed period from 1973-74 to 1993-94 productivity declined by 1.71% as indicated by the Translog index. Calculations of the Kendrick and Solow indices support this finding. Using a translog specification the econometric analysis reveals that technical progress in India's iron and steel sector has been biased towards the use of energy and material, while it has been capital and labour saving. The decline in productivity was caused largely by the protective policy regarding price and distribution of iron and steel as well as by large inefficiencies in public sector integrated steel plants.

Their analysis shows that with the liberalization of the iron and steel sector, the industry is rapidly moving towards world-best technology, which will result in fewer carbon emissions and more efficient energy use in existing and future plants. A variety of studies on productivity growth and technological change in Indian industries has been carried out so far. Originally, these studies were driven by an interest in understanding the capital vanishing phenomena in the Indian industry between 1950 and 1980. During that time labour productivity as well as capital availability and use increased considerably, while the overall growth rate of the economy, however, stagnated at low levels (see Ahluwalia, 1991). Concerned about the efficiency of resource use researchers started investigating productivity growth and input factor substitutions for aggregate manufacturing as well as various industries. The results of these analyses differed substantially depending on the methodology, statistical specification employed as well as on the underlying sources of data, levels of aggregation and time periods considered.

Over time, more sophisticated and refined methodologies in connection with longer time series were employed to study productivity change. The contribution of
total factor productivity to output growth was of primary interest to explain the still low economic development. Partial factor productivity was investigated to better understand the importance of each factor of production and to evaluate substitution possibilities. In this context the role of energy within the production process received increasing attention and consequently besides the primary factors of production (capital and labour), energy and materials was added as secondary input factors into the analyses.

Partial productivity growth estimates for capital are presented in the following Table. Except for the CSO study between 1969-77, estimates by various authors reveal negative capital productivity growth independent of the time period considered. Most study results range from -2.5% to -3.3% productivity loss per year. The CSO study reports capital productivity loss in this range, at -2.74% p.a., for the sub-period 1960-71 only. Over their whole study period, 1960-77, capital productivity decrease is lower at -0.81% p.a., while for the later years, 1969-77, the study reveals positive development of capital productivity, increasing at 2.07% p.a. Mehta’s results for the iron and steel sector differ substantially from all other authors’ calculations. According to Mehta capital productivity loss reaches an enormous -22.8%. The study period, however, encompasses a very early time period, 1953-65. It might thus account for the immediate effects of India’s independence from British colonialisation in 1947.

The labour productivity growth has been conducted by the same authors. Ahluwalia’s, Goldar’s and the CSO calculations result in positive productivity growth ranging from 0% to 1.48% p.a. for different time periods considered. Negative development has been reported by both, Kumari and Mehta. Kumari shows slight productivity loss at -0.74% for the period 1981-87, while Mehta again reveals a high decline of -5.2% p. a. for the earlier time period.

The overall trend in the iron and steel industry has been towards capital deepening as indicated by the development of the capital-labour ratio over time. All study results except one support this finding. The resulting estimates are more dispersed than the findings for capital and labour productivity. They range from 1.7% p.a. (CSO, 1960-77) to 5.1% p.a. (Ahluwalia, 1960-86).
Again, Mehta, obtains a very different result: capital labour ratio grows at 16.9% in the post independence period, 1953-65. In contrast, the CSO study shows a negative development for capital labour intensity, a decrease of -2.07% p.a. between 1969-77.

<table>
<thead>
<tr>
<th>Partial Productivity Growth</th>
<th>(selected time periods, per cent p.a.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>Capital VO/K</td>
</tr>
<tr>
<td>1973-85</td>
<td>-2.23</td>
</tr>
<tr>
<td>1985-91</td>
<td>-1.81</td>
</tr>
<tr>
<td>1991-93</td>
<td>-2.68</td>
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<tr>
<td>Trend Rate</td>
<td>-3.41</td>
</tr>
<tr>
<td>1973-93</td>
<td>-1.87</td>
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</tbody>
</table>

Note: Compound Growth; Trend Rate calculated as semi-logarithmic time trend, significant on 5% level.

Kumari (1972) estimates a Cobb Douglas and a CES production function for the Indian iron and steel sector using PE survey data for the period 1981-87. For both theoretical frameworks the estimates indicate growth of productivity, at a rate of 3.86% p.a. for the CD production function and at a rate of 4.2% p.a. for the CES production function setting.

Mehta (1980) as well estimates Cobb Douglas production functions for some energy intensive industries including the iron and steel industry. His sample period encompasses the years 1953 to 1965. Productivity in the iron and steel sector for his time period grows at 8.8% p.a. He further finds evidence of capital deepening in the production process but could not conclude any clear trend regarding efficiency improvements.

Bhardwaj (1987) analyzes plant level data for three plants and their aggregates for two time periods, 1962-89 and 1978-79. Estimating a translog cost function the aggregate estimation reveals a slight growth in productivity of 0.16% p.a. for the first period and a modestly higher growth of 0.59% p.a. for the other two-year period. The range of productivity change among the plants is quite large. For the longer time period results vary from a productivity loss of -0.02% for one plant (Rourkela) to a gain of 0.27% for another plant (Bhilai). Estimates for the second short period render the same relative pattern.
Estimates for productivity growth in the iron and steel industry are presented in Table 1.1 and Graph 1.1. Except for Kumari, the methodological details of the above authors have been discussed earlier. Kumari analysed productivity trends at the group level in the public sector enterprises for 11 groups of manufacturing industries. Steel comprised one of the 11 groups analysed by her. She used data drawn from Public Enterprises Survey. In other respects she followed the same procedures.

### Table 1.2 Partial and Total Factor Productivity Growth: Iron and Steel

<table>
<thead>
<tr>
<th>Period</th>
<th>Capital Productivity</th>
<th>Labour Productivity</th>
<th>K/L Ratio</th>
<th>TFPG</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mehta (1985)</td>
<td>1953-64</td>
<td>-22.8</td>
<td>-5.2</td>
<td>16.9</td>
<td>-6.3</td>
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<td></td>
<td>-22.9 K**</td>
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<tr>
<td>Goldar (1986)</td>
<td>1960-70</td>
<td>-3.23</td>
<td>0.96</td>
<td>4.19</td>
<td>-1.56</td>
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<td></td>
<td>K*</td>
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<tr>
<td>Ahluwalia (1991)</td>
<td>1959-85</td>
<td>-2.8</td>
<td>0.10</td>
<td>2.90</td>
<td>-1.60</td>
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<td>T**</td>
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<td>CSO (1981)</td>
<td>1960-77</td>
<td>-0.81</td>
<td>0.89</td>
<td>1.70</td>
<td>0.07</td>
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<td>K*</td>
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<td></td>
<td>1960-71</td>
<td>-2.74</td>
<td>1.48</td>
<td>4.22</td>
<td>-0.74</td>
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<td>K*</td>
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<td></td>
<td>1969-77</td>
<td>2.07</td>
<td>0.00</td>
<td>-2.07</td>
<td>1.29</td>
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<td>K*</td>
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<tr>
<td>Kumari (1993)</td>
<td>1971-87</td>
<td>-2.54</td>
<td>-0.74</td>
<td>1.80</td>
<td>-1.2</td>
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<td>-1.33 S**</td>
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<td>-1.55 K**</td>
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<td>1963-71</td>
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<td>-4.00</td>
<td>T**</td>
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<td></td>
<td>1972-81</td>
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<td>1.49</td>
<td>T**</td>
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<tr>
<td></td>
<td>1982-92</td>
<td></td>
<td></td>
<td>-2.40</td>
<td>T**</td>
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</table>

Notes: All numbers are growth rates per cent per annum. 
S indicates Solow index; K indicates Kendrick index; T indicates Translog index. 
* indicates compound annual growth rates. ** indicates semi-log trend rate of growth.
*

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Graph 1.3.

Figure 6.3.5 Total Factor Productivity Growth: Iron and Steel

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Year
Mr. Saptarshi Purkayastha published an article, named as **Analysing the Competitiveness of the Indian Steel Industry Using Structure- Conduct-Performance Paradigm.**

According to him, the analysis of the industry for enhancing competitiveness has for long been the subject for discussion for both academicians and practitioners. The seminal work on industry analysis was done by Mason in which he argued that that the structure of an industry would determine the conduct of buyers and sellers which in turn would determine the performance of the industry. The performance of the industry could be measured by profitability, innovativeness or efficiency. The purpose of this work is to examine the competitiveness of the India Steel Industry with the help of the Structure- Conduct- Performance (SCP) Model.

The traditional SCP Model approach postulated a relationship between structure and performance via conduct, which can be estimated across firms. Strickland & Weises were the first to put forward a model which explained the interdependence of structure, conduct and performance on one another.

\[ S = f_1(C, P) \] 
\[ C = f_2(S, P) \]
\[ P = f_3(S, C) \]

**Hypothesis Formulation**

The first parameter of the study in the SCP model is the structure of the industry. Structure is traditionally measured by the concentration ratio (CR). Concentration ratios depend upon technical factor, conduct and performance variables. Structure Conduct Performance

Hypothesis #1: Industry structure in the Indian steel industry depends upon the technical factors. Conduct or conditioning environment as Bain suggested investigates the measures that the buyers and sellers practice to arrive at decisions regarding price, output, advertisement etc. This includes interdependent behaviour in the form of collusion for joint profit maximisation, rivalry between firms or independent actions of one firm in relation to another.

Hypothesis#2: Firms in Indian Steel Industry collude to maximize joint profits The SCP framework, in the Indian Context, has used profitability as the performance indicator. The firm’s profit is the net result of two forces: - higher efficiency (conduct variable) and greater market power (structural variable).
Hypothesis #3: In the steel industry, performance depends upon both the structural and conduct variables.

Regression Equations for the hypothesis of the SCP Model

(A) Structure: Quantitatively, Mr. Purkayastha measures the structure of the industry on the basis of the concentration ratio (CR). CR probably depends upon the technical factors, conduct variables and the performance variables. The traditional measure of the technical factors is the economies of scale, which can be approximated as the cost of production.

Growth and government regulation can be taken as conduct variables and profit margin of the industry as the performance variable. Thus,

\[ CR = f(COP, PM, GRT, ENTPOL) \]

where,

\[ COP = \frac{Cost of Production}{Sales} \]
\[ PM = \frac{PAT}{Sales} \]
\[ GRT = \frac{Sales Growth}{Sales} \]
\[ ENTPOL = Government Policy in the regulated environment. \]

(B) Conduct: - In order to investigate whether collusion or rivalry is the dominant behaviour pattern in high CR industries, the effect that the second, third, fourth and fifth largest firms have on the leading firms' profitability is considered. The idea here is that in case rivalry is present intra-industry, then the second, third fourth and fifth firms are associated with lower profitability of the leader.

\[ LPROF = f(S1, S2345), \]

where LPROF = Profit Margin of the leading firm in the industry.

\[ S2345 = S2 + S3 + S4 + S5, \]

where S1, S2, S3, S4 & S5 are the market shares of the first, second, third, fourth and fifth largest firm in the industry.

But leading firms may still collude to avoid reductions in their profitability that arises from competition. In such a case, collusion would have little or no impact on profitability of the leading firm and might even have a negative impact. A firm that moves from being a monopolist to being a duopolist or an oligopolist is no longer able to enjoy monopolist profits. Although collusion might result in joint profit maximization but it might not increase the profitability of the leading firm. This interpretation implies that collusion cannot be ruled out even if the co-efficient of the second, third, fourth and fifth firms market shares is negative or insignificant Thus to
distinguish between these two possibilities, it is necessary to take the effect of industry profitability into account.

Second, third, fourth and fifth firms can be expected to increase industry profitability when there is collusion and decrease it when there is a competition.

Thus, \[ PM = f(S1, S2, 23, 45) \]

(C) Performance: - The SCP model measures profitability in terms of profit margin of the industry. Profit Margin has two endogenous variables, the concentration ratio reflecting the structure of the industry and growth, marketing expenses & government regulations reflecting the conduct of the industry.

Thus, \[ PM = f(CR4, GRT, COP, ENTPOL, Mktg Expenses) \]

According to Mr. Purkayastha the following conclusions have been obtained by running a regression analysis with data taken from CMIE database for the period covering 1990-2003. Concentration in the Indian Steel Industry is inversely proportional to government regulation. After analysis it was found that concentration depends only upon government regulation and not on technical factors as hypothesised. The relationship is inverse which suggests that higher the government regulation, the concentration in the industry will decrease.

Concentration of the steel industry has decreased over the period of study. CR4 has decreased by 25% from 1990 to 2003 and CR2 has decreased by 36.8%. Thus the top firms are increasingly losing market shares to the smaller players.

There is an evidence of collusion in the steel industry. The paper had hypothesised that in the Indian Steel Industry, firms collude to maximise profits. The analysis has proved our hypothesis right by showing a positive relationship between the leading firm’s profitability and the market shares of the second, third, fourth and fifth firms.

Profit Margin in the industry depends upon structural variables only. The paper had hypothesised that profit margin will depend upon both structural as well as conduct variables. But, the analysis shows that profit margin depends only upon structural variables, viz, cost of production and concentration ratio. With cost of production, profit margin is inversely related while with concentration ratio, it is positively related. But, we also found that concentration ratio depends inversely upon government regulation. Thus, to conclude, in order to obtain higher profitability in the Indian Steel Industry, firms must either lower their cost of production or government regulation must decrease which will lead to higher concentration and thus higher profit margin.