Proposal for Ph.D. Dissertation  
(Economics)

Ch. Charan Singh University, Meerut

A COMPARATIVE STUDY OF PRODUCTIVITY
IN PUBLIC AND PRIVATE SECTOR STEEL
COMPANIES

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INTRODUCTION

Steel industry is 'Key' or basic industry and as such it is impossible to exaggerate its importance for the further industrialisation of the country. In India steel industry occupies a Pre-eminent position both as regards to capital investment and the number of person given employment.

Steel is crucial to the development of any modern economy and is considered being the Backbone of human civilisation. The level of per capita consumption of steel is treated as an important index of the level of socioeconomic development and living standards of the people in any country. All major industrial economies are characterised by the existence of a strong steel industry and the growth of many of these economies has been largely shaped by strength of their steel industries in their initial stages of development.

Steel industry is a 'key' or basic industry and as such it is impossible to exaggerate its importance for the further industrialisation of the country. The rapid development of the iron and steel industry is a sinc qua non of economic development of a developing country like India.

In India steel industry occupies a pre-eminent position both as regards to capital investment and the number of person given employment, this sector represents around Rs. 90,000 crore of capital and directly provides employment to over five lakh people.¹

The Beginning of steel industry in India was made in 1874 when the Bengal Iron Works (BIW) came into being at Kulti, near Asansol in West Bengal. However, forty-four years before that in 1830 to be Precise a foreigner, named Joshua Marshall Heath, had set up a small plant at Porto-Novo on Madras Cost. His Method of Iron-making needed approximately four tonnes of charcoal to produce one tonne of low quality pig iron, which proved to be too expensive for Heath to carry on in the face of stiff competition from the British Steel Industry. The BIW made considerable improvement in the process of Iron and steel making. It used coke as the fuel Instead of charcoal. But the plant fell sick as the source of funds dried
up. It was taken over by the Bengal Government and was rechristened as Baraker Iron Works. In 1889, the Bengal Iron and Steel Company acquired the plant and by turn of the century the Kulti Plant became a success story. It produced 40,000 tonnes of Pig Iron in 1900 and continued to produce the metal until it was taken over by Indian Iron and Steel Company (IISCO) in 1936.2

Steel Authority of India Limited (SAIL), a Government Company, is responsible for the management of integrated steel plants at Bhilai, Durgapur, Rourkela, Bokaro and also Alloy Steel Plant at Durgapur and Salem Stainless Steel Plant. The management of IISCO was taken over by the Government on 14 July 1972 with a view to improving its working. The company is now a wholly-owned subsidiary of SAIL. SAIL took over Maharashtra Electrosmelt Limited, a mini steel plant presently producing Ferro-Manganese, in January 1986. Visvesvaraya Iron and Steel Limited a unit controlled by the Karnataka Government, was taken over by SAIL in August 1989. On 23 May 1997. The company became a 100 per cent subsidiary of SAIL. It was merged with SAIL in 1998-99. Authorised capital of SAIL and paid up capital as on 31st March 1999 are Rs. 5,000 crore and Rs. 4,130.40 crore respectively.

For modern India's iron and steel industry August 24, 1907 was a red-letter day when the Tata Iron and Steel Company (TISCO) was formed as a Swadeshi venture to produce 120,000 tonnes of pig iron. The TISCO plant at Sakchi (renamed Jamshedpur) in Bihar, started pig iron production in December, 1908 and rolled out its first steel the following year. TISCO had expanded its production capacity to one million tonnes ingot by the time the country achieved freedom. The Tatas, as Gandhiji said, represented the "spirit of adventure" and Jamsetji Tata, in the words of Jawaharlal Nehru", laid the foundation of heavy industries in India". The British rulers disfavoured this and other attempts to start indigenous industry. It was chiefly with the help of American experts that the Tatas started their

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1 Overview of Iron and Steel Industry, Chapter-II (GOI) Publication.
industry. Its childhood was precarious but the war of 1914-18 gave it a fillip. Again it languished and was in danger of passing into the hands of British debenture holders. But nationalist pressure saved it.

**ROLE OF PUBLIC SECTOR AND PRIVATE SECTOR STEEL COMPANIES:**

The Public Sector Steel Authority of India (SAIL) with five Integrated Steel Plants at Bhilai, Bokaro, Durgapur, Rourkela and Burnpur (run by IISCO, the Subsidiary of SAIL) is the largest producer of steel in India and eleventh largest in the world. SAIL has four Alloy Steel and Ferro-alloys Units at Durgapur, Salem, Chandrapur (run by SAIL Subsidiary Maharashtra Electrosmelt Ltd.) and Bhadravati (run by SAIL Subsidiary Visveswaraya Iron and Steel Limited). Together with Visakhapatnam Steel Plant of Rashtriya Ispat Nigam Limited (RINL) another Public Sector Company. The public sector accounts for a major portion of the total production. The Balance is produced by the private sector, mainly by TISCO, the oldest steel plant in the country. The private sector, which was producing 7.4 million tonnes of finished steel with market share of 51.4 percent in 1991-92 has been at present playing a major role in steel production.

Productivity is the real index of efficiency of an organisation. As efficiency should get reflected in productivity measures, productivity is considered to be a good proxy for efficiency. Productivity is the relationship between physical output and one or more of the physical inputs used in the production process. It is expressed as a ratio to reflect how efficiently resources are used in creating outputs. Productivity measurement enables the firms to compare themselves and provide perspective on firms financial data.³

REVIEW OF LITERATURE

Many studies on productivity trends in Indian manufacturing sector have been carried out over the last few decades. Apart from studies of total manufacturing there have been many studies of industrial industries too. In all these studies the major trends in productivity have been examined and compared on all India or on state level.

S.S. Mehta has examined the trend in productivity for 27 industries for the period 1953-65. He has constructed partial and total factor productivity for these 27 industries. In his study, he found that labour productivity has increased significantly in industries like vegetable oils, chemicals, glass etc. and insignificantly in matches, iron etc. In most of the industries the trend of capital productivity is on decline. Over all efficiency in modern industries like bicycles, electric fans, glass and glass were etc. has been fairly satisfactory whereas it has declined in the traditional industries like cotton textiles, jute, matches, sugar. Mehta, study suggests that analysis at the industry level are necessary because they reveal the differential performance of individual industries.4

In another study Hajara concluded that between 1947-58 growth of productivity in some of the industries in question not lag behind the rise in wages. In some particular industry e.g., cotton textile growth of productivity is low, while in others, e.g., jute and sugar productivity growth is much higher.5

In another study "Chio Lim" stated that" by increasing the efficiency and effectiveness of your factors of production you can increase production and through the formula mentioned above accordingly reduce your per unit cost, or slow down it increases. To work your factors of

4 Mehta, S.S. "Productivity, Production function and technical change in some Indian Industries, Thesis Submitted to Gujrat University, Sardar Patel Institute of Economics and Social Science Research, Ahmadabad, 1976."

production better, I have recommended on exercise in capacity management, which can be summarised as follows.

- Measure your capacity based on existing resources.
- Measure the utilization your present study.
- Examine ways you can utilize on scale down unused capacity.
- Prepare a business plan.
- Right size your capacity to fifth your business plans with the view of generating profit.\(^6\)

In some particular industry like cement industry, many challenges lie ahead, increase in productivity is imperative in order to raise the standard of living and also to make the Indian exports globally competitive. From their study K. Chidambaran and S. Muthukrishnan found that the overall productivity from (1990-91 to 2001-02), selling. Distribution and Administration productivity from (1990-91 to 2001-02) and Labour productivity from (1990-91 to 2001-02) is higher in Madras Cements than of India Cement. From the above study, we can generally state that, cement industry will have to devise strategies for economizing the use of inputs and curtailing costs so as to remain competitive in the global trading environment. The Madras Cements limited, which is favourite of many counts, shall go for further excellence in improving its productivity while maintaining its existing stronghold area. The Indian Cements which posses good Infrastructure shall take a look into the areas where they are very weak and should rise up to meet the challenges posed by various factors.\(^7\)

A Tata Services study on productivity trends in Indian manufacturing in the pre-and post-reform eras shows that the private sector has performed better than the public sector, and the private sector giants have done even better.

\(^6\) Lim, Chio, "Controlling cost through capacity management, 1997."
The study takes a holistic look at the growth of productivity parameters in four sectors: the all-India factory sector (Public + Private): Private manufacturing Industry: the top 50 private manufacturing companies and six major manufacturing companies of the tata group (Tata steel, Tata motors, Tata chemicals Rallis, Voltas and Titan).

The all India factory sector study has been based on the annual survey of industries (ASI), which covers 1,31,558 factories in the public and private sectors. In this study they found that, in terms of average annual growth of TFP, the post-reform performance of the tata group zoomed ahead to 4.37 percent, from 1.80 percent during the pre-reform years, compared to a marginal increase from 0.68 to 0.97 percent for the all India factory sector.

OBJECTIVES OF THE STUDY

In the present study, an attempt has been made to measure, analyse and compare some concepts regarding productivity as labour productivity, capital productivity and total factor productivity in public sector steel company SAIL and private sector steel company TISCO, during the period from 1990-91 to 2003-04.

The main objectives can be summarized as follows:-

1) Measurement, analyses and comparison of the labour productivity in SAIL and TISCO.
2) Measurement and comparison of the growth of labour productivity in SAIL and TISCO.
3) Measurement, analyses and comparison of the capital productivity in SAIL and TISCO.
4) Measurement and comparison of the growth of capital productivity in SAIL and TISCO.

Chidambaram K. and Muthukrishnan, S., Operating efficiency in terms of productivity. "A comparative study of Madras Cements and India
5) Measurement and comparison of the total factor productivity in SAIL and TISCO.

6) Measurement and comparison of the growth of total factor productivity in SAIL and TISCO.

**IMPORTANCE OF THE STUDY**

India's effort at globalisation and increasing international competitiveness, under the WTO imperatives, the importance of productivity both partial (L and K) and total factor productivity can not be exaggerated. India continues to be the 10th largest steel producer in the world.

In 1977 India's per capita steel consumption was only 22 kg, which was much below the world average of about 126 kg. Even if domestic demand grows up from 34.5 M.T. to 100 M.T. in 2025 the Industry is unlikely to catch up with the production in developed countries.

To enhance the productivity of the steel industry has to find out the major causes that are hampering its growth and has to find appropriate solution for them.

The proposed study "A Comparative Study of Productivity in Public and Private Sector Steel Companies" in the context of SAIL and TISCO will try to find out the major causes that are affecting the growth of the steel industry in the country.

**METHODOLOGY EMPLOYED**

(i) **Partial Productivities**- To find out partial or factor productivities of labour and capital, we shall calculate labour productivity as-

\[
\text{Labour Productivity (Lp)}
\]
Lp = \frac{GVA}{Labour}

GVA = Gross Value Added at Constant Price.

Labour = Number of employees

Capital Productivity (Cp)

Cp = \frac{GVA}{Capital}

GVA = Gross Value Added at Constant Price.

Capital = Capital Added in real terms.

(ii) **Total Factor Productivity** – Kendrick approach will be used

**KENDRICK APPROACH:-**

This is a common measure of total factor productivity (TFP) based on arithmetic indices.

It has been used by Schmookler, Abramovitz, Davis, and others.

It is based on the linear production function.

(i) \[ Y = a_L . L + a_K . K \]

Where \( a_L \) = Ratio of labour input to the value of output

\( a_K \) = Ratio of capital input to the value of output

It defines the productivity index \( A \) as-

\[ A = \frac{Y}{W_0 . L + r_0 . K} \]  

(2)

Where Zero subscript indicates base year.

In equation (1) \( A \) is average productivity of arithmetic combination of \( L \) and \( K \) with factor prices in the base year as weights. Thus, we can define productivity as-
$$\frac{Y}{Y_0} = \frac{A(W_0 \cdot L + r_0 \cdot K)}{Y_0}$$

$$= A\left(\frac{W_0}{Y_0} \cdot \frac{L}{L_0} + \frac{r_0}{Y_0} \cdot \frac{K}{K_0}\right)$$

$$= A\left(\alpha_0 \cdot \frac{L}{L_0} + \beta_0 \cdot \frac{K}{K_0}\right)$$

or

$$A = \frac{Y/Y_0}{\left(\alpha_0 \cdot \frac{L}{L_0} + \beta_0 \cdot \frac{K}{K_0}\right)}$$

Where $\alpha_0 = \frac{W_0 \cdot L_0}{Y_0}$

$\beta_0 = \frac{r_0 \cdot K_0}{Y_0}$

While this method is quite widely used, it involves arbitrariness with respect to the choice of base year.

(iii) Sources of Data-

The data will be collected from annual industrial survey, Economics Survey, and annual reports of the Industries. We shall also hold discussions with social scientists working in the field of steel industry, representatives of the management and leaders of the Trade Unions with a view to incorporating their valuable suggestions and confirming our conclusions in the study.
CHAPTER SCHEME

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BIBLIOGRAPHY
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<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annon</td>
<td>A study of productivity in the iron and steel industry in Indian manpower, 1996, 5:3, p. 110.</td>
</tr>
<tr>
<td>Balakrishnan, P. and Pushpanagdan, K.</td>
<td>What do we know about productivity growth in Indian industry? EPW, 1998, 33: 33 and 34, pp. 2241-2246.</td>
</tr>
<tr>
<td>Business Standard</td>
<td>Media report (The private sectors great leap forward), Nov. 6, 2003.</td>
</tr>
<tr>
<td>Bhatia, D.P.</td>
<td>Estimates of value added at constant prices in the manufacturing sector : and</td>
</tr>
</tbody>
</table>
erroneous methodology, EPW 1987, 16, pp. 721-723.


Council for Technical Advancement : The advancement of productivity, Chicago, April, 1953.


Denis Cepede and Pierre Gonod : "The concept and Measurement of Productivity", p. 27.


Evan, Clague : Productivity employment and living standard conference on productivity University of Wisconsin, June 3, 1949.


Ghosal and Ghore, S.N. : A study of productivity in important industries in India, Productivity – measurement preview, 1964, 38.


Kumari, A.  :  Productivity in Public Sector, EPW, 27 Nov., 1993, pp. MI45-MI-162.


Pradhan, G. and Barik, K.  :  Fluctuating Total Factor Productivity in India. Evidence from selected Polluting


Siegal, I.H.: The concept and measurement of Productivity and production working
(paper of national conference on Productivity), 1952.


