

An Empirical Analysis of Capital Intensity in Steel Re-Rolling Units of Gobindgarh

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ABSTRACT

Iron and steel industry is the very basis and foundation of the entire modern industrial structure of all the advanced nations of the world. It not only provides input to a number of industries but also provides a wide variety of goods which have both domestic and foreign market. Steel is the kingpin of the industry. It has an added significance at this juncture in our economy when the twin objectives of defence and development are the forefront. Mandi Gobindgarh, popularly known as Jamshedpur of Punjab occupies an integral position in the production of iron and steel in the country. In this setting of argument, the present study is an attempt to look into capital intensity of iron and steel re-rolling industry at Mandi Gobindgarh. The objective of the study is to examine the economic performance of industrial units in Mandi Gobindgarh and Punjab in the light of investment and employment criterias and in terms of labour and capital intensities, using different ratios, depending upon the availability of data. This study covers the time period 2007-08 to 2011-12.

Keywords: *Structure, Intensity, Performance.*

INTRODUCTION

Iron and steel industry is the very basis and foundation of the entire modern industrial structure of the advanced nations of the world. It not only provides input to a number of industries but also provides a wide variety of goods which have both domestic and foreign market. Steel is the kingpin of the industry. It has an added significance at this juncture in our economy when the twin objectives of defence and development are the forefront. Mandi Gobindgarh, popularly known as Jamshedpur of the Punjab occupies an integral position in the production of iron and steel in the country. Out of 320 re-rolling mills in Punjab, 200 mills are situated only at Mandi Gobindgarh, which constitutes more than 65 percent of total industry of Punjab. In this setting of argument, the present study is an attempt to look into capital intensity of iron and steel re-rolling industry at Mandi Gobindgarh.

OBJECTIVES

The objective of the study is to examine the economic performance of industrial units in Mandi Gobindgarh and Punjab in the light of investment and employment criterias and in terms of labour and capital intensities, using different ratios, depending upon the availability of data. This study covers the time period 2007-08 to 2011-12.

METHODOLOGY

For showing capital intensity, 40 firms have been approached and data have been collated through questionnaire. At some places, published data also have been used. The study is based in proportionate stratified random sampling plan to draw a representative sample of 12 small units with investment up to 7.5 lakhs, 15 medium units with investment up to 15 lakh and 13 large units with investment more than 15 lakhs. We have set up a certain hypothesis and tested them by applying t-test. Conceptually, size and capital intensity have been recognized as important parameters in the evolution of any industry. The importance of the size of an industry has always been a part of the conventional wisdom. Industry size is measured, variously, in terms of levels of sales, assets, value-added, capital deployed. Capital intensity is measured by formula,

Capital intensity = Fixed capital/Total Number of Persons Employed.

Similarly output capital ratio and output labour ratio are taken as measure of capital and labour productivity. Spearman's rank co-relation is used to see co-relation between size and capital intensity, size and economic characteristics and economic characteristics and capital intensity.

REVIEW OF THEORY AND EMPIRICS

One of the early studies on the size and capital intensity of the Indian industry i.e. Rosen (1988) attributed smaller size and lower capital intensity in India vis-à-vis the advance economies, to the difference in availability of factors and lack of access to capital market which generally encourages the use of capital intensive methods. According to Rosen “while there has been some apparent trend toward greater capital intensity in India, there is a tendency toward more widespread introduction of labour saving equipment; this trend has not been so great as to result in any clear positive relationship between size of firm and capital output ratios”. Subsequently, on the basis of a comprehensive analysis of 22 industries during the period, 1993-96, Sandesara (1999) concluded that while small sized unites in some industries are labour intensive, in some others they turn out to be capital intensive. In other words there was little evidence on a clear and uniform relationship between size and capital intensity. Khan (2000) measured the degree of capital intensity in twenty industries in Pakistan by using capital-labour ratios for the year 1962-63 on the basis of CMI data. By comparing his estimates with the united states and japan he also reached a startling conclusion that on average the capital intensities for Pakistan manufacturing were higher than for japan or were close to the capital intensities for Kemal (1976), Hamid (1978) and Afridi (1985) also reported a high degree of capital intensity in the manufacturing sector of Pakistan.

A disaggregated industry-wise analysis by Thomas (2006) showed that capital intensity varies widely across different industries. It has been the lowest in jute textiles while being the highest in electricity generation, transmission and distribution. Industry group –wise, viz., basic metals, chemicals, rubber and petroleum have highest capital intensity while jute, beverages, textile products, leather, wood products, and food products continue to be least capital intensive sectors in the Indian manufacturing.

HYPOTHESIS

The hypotheses proposed to be tested are:

- 1) Small factory units employ less capital per worker compared to the large scale one. The hypothesis is that there is a positive co-relation between the factory size and capital intensity (K/L).
- 2) Small scale factory units generate lower output per worker than large one. This is hypothesis of positive co-relation between factory size and labour productivity. Small units employ more labour and less capital.
- 3) Small scale units generate higher output per unit of capital than the large ones. This is the hypothesis of negative co-relation between size and output capital ratio.

ANALYSIS

Following is the analysis of data in respect of units located at Gobindgarh.

- 1) **Size and capital intensity:** The hypothesis tested here is of positive co-relation between factory size and capital intensity. In table 1, the value of rank co-relation co-efficient is positive and highly significant at 5 percent level in all the five years. The evidence is taken as broad indicator in favor of hypothesis.

Table-I
Capital Labour Ratio

Size (fixed capital in Rs. lakhs)	2007-08	2008-09	2009-10	2010-11	2011-12
2.5-5.0	301.22	277.6	273.1	322	320.03
5.0-7.5	1170.04	1434.8	1019.7	1060.0	963
7.5-10	2537.16	1916.6	2218.6	3210.06	2416.6
10-12.5	4644.40	4416.4	3956.7	3131.6	3601.4
12.5-15	4205.07	3903.2	3738.6	3710.2	3884.7
15 and above	7856.9	6666.4	7271.4	6819.4	5890.2

R=	2007-08 0.9	2008-09 0.9	2009-10 1.0	2010-11 0.9	2011-12 1.0
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Source: calculated

Size and economic characteristic:

- a) **Size and output per worker:** table two shows that the value of co-efficient is positive in all the years except 2008-09 (when the value of r is negative) and therefore, rejecting the hypothesis but for other years, evidence is supporting the hypothesis that large scale units employ more capital and less labour. They go in far capital intensive technique and hence output per worker is relatively at a high level.

Table -2
Labour productivity (output labour ratio)

Size (fixed capital in Rs. lakhs)	2007-08	2008-09	2009-10	2010-11	2011-12
2.5-5.0	43577	70126	46276	47058	40621
5.0-7.5	37143	70908	33363	43234	38604
7.5-10	84220	61479	68275	87842	85498
10-12.5	161195	69486	142260	141050	134161
12.5-15	159329	151955	137653	187850	180836
15 and above	33444	68834	82355	173591	184559

R=	2007-08 0.03	2008-09 -0.1	2009-10 0.7	2010-11 0.8	2011-12 0.9
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Source: calculated

Table-3
Output Capital Ratio (capital productivity)

Size (fixed capital in Rs. lakhs)	2007-08	2008-09	2009-10	2010-11	2011-12
2.5-5.0	145.66	135.66	169.4	145.8	126.8
5.0-7.5	33.67	37.22	32.71	40.75	40.08
7.5-10	39.63	59.29	47.91	35.03	52.67
10-12.5	39.96	36.41	46.30	63.43	44.69
12.5-15	40.81	41.15	41.26	56.58	64.82
15 and above	5.17	12.39	1.33	29.62	37.74

R=	2007-08	2008-09	2009-10	2010-11	2011-12
	-0.4	-0.7	-0.6	-0.5	-0.4

Source: calculated

Table -3 shows that co-relation co-efficient is negative for all the years and thus supporting the hypothesis of negative co-relation between factory size and output capital ratio.

Capital Intensity and Economic Characteristics:

Table-4
Capital Intensity and Economic Characteristics

Year	R12	R13
2007-08	0.09	-0.4
2008-09	-0.08	-0.9
2009-10	0.7	-0.6
2010-11	0.8	-0.7
2011-12	0.9	-0.4

R12: Rank correlation between capital intensity and output labour ratio

R13: Rank correlation between capital intensity output capital ratio

From table-4, It is seen that barring one year (2008-09) the industry has positive co-relation between capital intensity and labour productivity. Further negative values of coefficient R13 support the negative hypothesis that capital intensity and output capital ratio are negatively correlated.

CONCLUSION

From the above results, we conclude that capital labour ratio increases with corresponding increase in factory size. It is seen that capital labour ratio in the steel re-rolling units is very high, because large amount of capital is needed to purchase the big and huge capital equipment to re-rolling the given material. There is convincing evidence that overall capital intensity increased and substitution of capital for labour had been taking place. It indicates that re-rolling mills in Mandi Gobindgarh

are capital intensive and due to this capital intensive profits are small proportional to large capital investment. Labour productivity is also increasing in re-rolling industry as the value of rank co-relation co-efficient between capital intensity and output per worker is increasing. Similarly capital productivity is also increasing. These are due to the superior quality of their entrepreneurs and high efficiency of their technical and general workers. Increasing capital-labour ratios may be due to many factors such as the changes in relative factor prices and the increased use of imported technology. It is not clear at this stage whether the changes in K/L ratios were driven by the changes in technology or by relative factor price. This would require a detailed analysis of the features of technology and the form of the production function in the manufacturing sector

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