

## Study of Role of Indian Iron and Steel industry for the Economic Development of the Nation

Dr Sapna Ghutke, Assistant Professor, Dr S C Gulhane  
Prerna College of Commerce, Science and Arts, Nagpur

### Abstract

India has emerged as the rapidly growing economy in the world and is anticipated to rank among the top three economic powers in the next 10 to 15 years. India's economic growth is dependent upon its Iron and Steel industry to the large extent. The present research paper is an attempt to bring into light the richness of Iron and Steel industries in Nagpur.

This research paper explains the history of Iron and Steel in India. This has been followed by the explanation of the post-independence scenario of the Iron and Steel industry in India. Later the role of Iron and Steel Industry in India GDP for the development of the country is highlighted.

Steel consumption is regarded as a measure of a nation's economic progress. While steel still dominates traditional industries like construction, housing, and ground transportation, the usage of specific steels in engineering fields like fertilizers, petrochemicals, and power generation is growing.

### Introduction

*"No country can be politically and economically independent unless it is highly industrialized and has developed its resources to the utmost".*

- Prime Minister Pt. Jawaharlal Nehru

India's economic growth is contingent upon the growth of India's vibrant iron and steel industry. Consumption of steel is considered as an indicator of economic development of the country. While steel continues to have a stronghold in traditional sectors such as construction, housing and ground transportation, special steels are increasingly used in engineering industries such as power generation, petrochemicals and fertilizers. Large amounts of iron and steel is required for constructing bridges, rail tracks, railway rolling stock, ships, vehicles, various machines etc. Railway locomotive, Ship Building, Heavy and Light Machine construction depend on the availability of iron and steel. Iron and steel industry accelerates industrialization and is therefore called the backbone of all Industries. [1]

### Production of Iron and Steel

Iron is the primary raw material used to produce steel – itself an alloy of concentrated iron with a minute amount of carbon. After oxygen, silicon and aluminium, iron is the fourth most plentiful element in earth's crust. It occurs in certain minerals, the most important being magnetite, hematite, goethite, pyrrhotite, siderite, ilmenite and pyrite. The term 'iron ore' is used when rock is sufficiently rich in iron minerals to be mined economically. Iron production requires iron ore, coal and stone (limestone, dolomite).

Steel production requires iron, steel scrap and flux ('lime'- calcined limestone). The iron ore is smelted to produce an impure metal called 'hot metal' when liquid or pig iron when solid. The hot metal is refined to remove impurities and to develop the desired composition. The liquid steel is continuously cast into blooms, slabs or billets and these semi-finished products are processed into the desired shapes by rolling or forging.

The iron and steel industry is divided into four groups as below:

- Iron and steel integrated producers
- Steel integrated companies
- Steel processors

- Foundries and fabricators

The succeeding paragraph follows the explanation of each of these groups.

#### Iron and steel integrated producers

Iron and steel integrated producers (ore based) are typically large firms that operate ore and coal mines (frequently as joint ventures) as well as iron and steel making plants.

The major iron and steel integrated producer in India includes Tata Iron and Steel Company Limited (TISCO), Rashtriya Ispat Nigam Limited (RINL) and Steel Authority of India Limited (SAIL), etc.

#### Integrated steel producers

Integrated steel producers depend on scrap as their source of iron. They can make the same range of semi-finished (slabs, blooms and billets) and finished steel products as the larger iron and steel integrated producers (hot-and –cold roll strip, rod, bars and shapes).

The major integrated steel producers in India includes Tata Steel, Mideast *Integrated Steel* Ltd. (MISL), Steel Authority of India

Integrated steel plants are located wherever it is economically feasible to bring together large quantities of the raw materials required. Other integrated steel plants, however, have been built in areas where abundant scrap and a ready market for finished steel exists.

#### Steel processors

Steel processors purchase semi-finished and hot and cold rolled steel products from the integrated companies and custom process them for resale to fabricators wanting steel quantities too small for the integrated companies to handle economically. Scrap recycling companies are included in this group.

The steel processors in India include SAIL, Essar steel, Tata steel, etc.

#### Foundries and fabricators

Foundries, often small, produce various grades of cast iron and /or steel. The molten metal is ladled or poured into sand or metal moulds. The cast parts produced can be complex in shape and often designed to meet one of a kind of end uses.

Fabricators take the various primary steelmill products and turn –cut-to-size, shape, machine, thread,punch, join,protective coat, etc. – into a host of commercial and industrial products.

The foundries in India include Sri Abhirami Foundries, Sandfits Foundries Private Limited (ISO 9002), V.R.Foundries in Coimbatore and Dakshin Foundry Pvt Ltd Bangalore, etc.

Fabricators in India include Durgalaxmi Iron and Steel Fabrication India, Laxmi Iron and Steel, Nagpur, etc. [2]

### **History of Iron and Steel Industry in India**

The manufacturing of iron and steel had been known to the people of India since years. The history of steel-making in India can be traced back to 400 BC when the Greek emperors used to recruit Indian archers for their army who used arrows tipped with steel.

Many more evidences are there of Indians' perfect knowledge of steel-making long before the advent of Christ. Archaeological finds in Mesopotamia and Egypt testify to the fact that use of iron and steel was known to mankind for more than six thousand years and that some of the best products were made in India. Among the widely-known relics is the iron pillar in QutabMinar of Delhi as shown in Figure3, withstood corrosion for the last 1600 years, is a testimony to the high level of skill achieved by ancient Indian iron smiths in the extraction and processing of iron.

The primacy of iron technology in the Indian subcontinent is well established and there are several published books on the state of ancient Indian iron technology. Sushruta who was an authority on medical science in ancient India had described many surgical instruments in his book (3<sup>rd</sup> or 4<sup>th</sup> Century BC). One can find many descriptions of swords, daggers, spears, and other steel weapons in a number of ancient Indian literatures. Iron technology has grown steadily in ancient India and Indian iron and steel products were in great demand. The testimony of the craftsmanship and antiquity of Indian iron and steel industry

is visible from the iron objects belonging to pre Christian era found from the burial sites at Adichinallur in Tinnevely district in Tamil Nadu. Ancient Tinnevely district comprised present Tirunelveli and Thoothukudi districts and parts of Virudhunagar and Ramanathapuram districts. Some of other evidences of use of iron and steel products in ancient India are given below.

- Presentation of 30 pound piece of steel by king Porus to the conqueror king Alexander of Macedon.
- Iron pillar weighing around 6 tons was built between 350 and 380 AD in New Delhi.(Fig 1)
- Iron beams of Konark temple in Orissa (9 th century AD)
- Iron pillar weighing around 7 tons at Dhardistrict in Madhya pradesh (12 th century AD)
- The Iron pillar at Kodachadri hill (12 th century AD) is of about 40 feet length is planted erect in front of MoolaMookambika Temple near peak of Kodachadri and it is compared with massive similar historic iron pillars located at Dhar, Mount Abu etc.
- The Tanginath temple of lord Shiva (12th century AD) in Jharkhand has a centuries old trident ('trishool') of rustproof iron.
- A large numbers of guns (16th and 17th centuries). Some of these guns weigh over 35 tons.

The superior corrosion resistance of the Indian iron produced during these periods is quite evident although the chemical composition is not much different than the iron samples from Japan and Iran etc. All the above clearly suggest that India was in the forefront of making iron and steel objects and the iron steel industry in India was remarkable in quality as well as forging and welding of heavy objects.

Iron technology reached significant heights during the Gupta period. Wootz, a very special kind of crucible steel, generally known as Damascus steel was originally produced in India sometimes around the opening of the Christian era or may be even earlier. India has mastered the production of wootz steel from which world famous tough swords were manufactured. Iron in ancient India was extracted by the direct process. The iron-rich ores were reduced by means of charcoal and the end product was almost pure iron (with entrapped slag particles). These wrought iron lumps were generally utilized for making several useful objects. The iron lumps were carbonized by the crucible process in order to produce wootz steel. The property of carbon steels was strictly controlled by decarburizing and tempering treatments. Wootz steel was exported from India in enormous quantities to the Middle East and Europe during the medieval period because the technology for the production of such steels was considered to be the best in India. [3]

### **Post-independence Scenario of Indian Iron and Steel industry**

The Indian economy at the time of independence showed all the signs of stagnation. About 72% of the work force was employed in agriculture and it contributed to nearly 50% of the national income. Industrialization was at a very low level with only 2% of the workforce employed in industries. In addition to this there was hardly any investment in industries. Thus, at the time of Independence, low agriculture output, little industrialization, low figure of national income, high poverty and unemployment, slow economic progress were the features of India's economy.

The government under our first Prime Minister Pt. Jawaharlal Nehru was focused on development of indigenous industries which had been completely destroyed under British rule. The emphasis was on state control in finance, a strong public sector and import substitution. Pt. Jawaharlal Nehru implemented a Five-year plan for the Indian economy. [4]

Iron and steel of the nation were the harbinger of industrial revolution in late 18th and early 19th century. Today this industry has proved to be the forerunner of globalization. It is one of the very few industries that have assumed a global character with developments in one region affecting the industry almost everywhere else; and India is no exception.[5]

The first notable attempt to revive the 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 Coast. Heath produced in his plant pig iron at the rate of forty tonnes a week. 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 (Bengal Iron Works) made considerable improvements 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 Barakar Iron Works. In 1889, the Bengal Iron and Steel Company acquired the plant and by the 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.

For modern India's iron and steel industry, August 27, 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. The 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 Jamshedji 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 industry. Its childhood was precarious but the war of 1914-18 gave it a boost. Again it languished and was in danger of passing into the hands of British debenture holders. But nationalist pressure saved it. In 1918, soon after the war, Indian Iron and Steel Company (IISCO) was formed. The then Mysore government also decided to start an iron works at Bhadravati. While IISCO started producing pig iron at Burnpur in 1922, the Mysore Iron and Steel Works took about 18 years to start its plant. Meanwhile, the Bengal Iron Works went into liquidation and merged with IISCO. The Steel Corporation of Bengal (SCOB) formed in 1937, started making steel in its Asansol plant. Later in 1953, SCOB merged with IISCO.

The Government's Industrial Policy had undergone changes-once in 1956 and then in 1991. The resolution modified in 1956 brought changes in the category pattern and listed more industries for the public sector than did the earlier one, though it was not harsher towards the private enterprise. In the new industrial policy announced in 1991, Iron and Steel industry, among others, was included in the list of industries reserved for the public sector and exempted from the provision of compulsory licensing. With effect from May 24, 1992 iron and steel industry was included in the list of 'high priority' industry for automatic approval for foreign equity upto 51% (now 74%). Export-import regime for iron and steel has also undergone major liberalization. The freight equalization scheme was withdrawn removing freight disadvantage to the states located near steel plants.

However, there is hardly any scope for complacency over the fact that India continues to be the 10<sup>th</sup> largest steel producer in the world. In 1997, India's per capita steel consumption was only 22 kg which was much below the world average of about 126 Kgs. Even if the domestic demand grows up from 34.5 million tonnes to 100 million tonnes in 2025 the industry is unlikely to catch up with the production in the developed countries.

India at present ranks third, in respect of iron-ore and coal, the U.S.A, Russia being first and second respectively. It is a matter of pride that it is the eighth largest producer of steel in the world and second largest in human resources next to China. India occupies a central position on the global steel map, with the establishment of new state-of-the-art steel mills, acquisition of global scale capacities by players, continuous modernisation and upgradation of older plants, and improving energy efficiency.

Thus, it can be said with a certain measure of confidence that India's iron and steel industry which had a glorious past and has an uncertain present may now look forward to a bright future. [6]

### **Role of Iron and Steel Industry in India GDP**

The Role of Iron and Steel Industry in India GDP is very important for the development of the country. In India the visionary ShriJamshedji Tata set up the first Iron and Steel manufacturing unit called Tata Iron

and Steel Company, at Jamshedpur in Jharkhand. Iron and steel are among the most important components required for the infrastructure development in the country.

### **Role of Iron and Steel Industry in India GDP-Facts**

- The Iron and Steel Industry in India is one of the fastest growing sectors
- The demand drivers for the Indian Iron and Steel industry are increase in the activities of the automobiles industry, real estate industry, transportation system, aircraft industry, ship building industry, etc.
- India ranks 5th in the world in terms of production of steel
- The amount of crude steel produced in 2006-07 was 50.71 million tonnes
- The amount of finished steel produced in 2006-07 was 51.9 million tonnes
- The production of finished steel was increased by 16.52%
- The production of finished carbon steel was 24.8 million tonnes in the year 2006-07
- It is expected that India would become the second biggest producer of steel within the year 2016 and the production per year would be 137 million tonnes
- The exports pertaining to the steel industry was 6.26 % during the period 2006-07

### **Role of Iron and Steel Industry in India GDP-Consumption**

- The domestic consumption of steel has grown by 12.5% in the past three years
- The domestic steel consumption in the year 2006-07 was 41.14 million tonnes
- The average growth rate of the Indian Iron and Steel Industry is 11.36%
- The construction projects all over India are major consumer of steel
- The per capita consumption of steel in India is 35kgs
- As the per capita consumption of steel is lower than other countries, so the steel industry has huge opportunities in the future

### **Role of Iron and Steel Industry in India GDP-Growth in Future**

- The ArcelorMittal, which is the largest steelmaker in the world, has plans of establishing two Greenfield steel projects with capacity of 12 million tonnes annually, in India
- Acerinox SA, one of the important stainless steel manufacturers in collaboration with Nisshin Steel, Japan is setting up a steel plant in India
- The Tata Steel ranks 5th in the world steel production and the company have plans of expanding its capacity by the year 2015
- SAIL, India's biggest producer of steel has plans of increasing the production to 24.98 million tonnes annually
- Sinosteel Corp, China are planning to invest US\$ 4 billion to set up a 5 million tonnes capacity Greenfield steel plant
- The acquisition of the Corus, the Anglo-Dutch steel manufacturer by the Tata Steel
- The Algoma Steel, Canada was acquired by Essar Global for US\$ 1.63 billion [7]

The progress of Iron and Steel industry India is as shown in the following table:

Year	Hot metal (including Pig iron) in Million tonnes	Crude Steel (Million tonnes)	Semi-finished steel (main plants) Million tonnes	Finished steel (including secondary producers) in Million tonnes	Steel castings (Thousand tonnes)

1950-51	1.7	1.5	1.2	1	N.A.
1960-61	4.3	3.5	1	2.4	35
1970-71	7	6.1	0.9	4.6	62
1980-81	9.6	10.3	2	6.8	71
1990-91	12.2	N.A.	4.3	13.5	262
1996-97	18.8	23.8	N.A.	22.7	393.4
1997-98	19.2	24.7	N.A.	23.4	392.5
1998-99	18.2	23.1	N.A.	24.7	370.1
1999-00	N.A.	N.A.	N.A.	28.5	386.9
2000-01	N.A.	N.A.	N.A.	30.3	352.4
2001-02	N.A.	N.A.	N.A.	31.1	409.3
2002-03	N.A.	N.A.	N.A.	34.5	483
2003-04	N.A.	N.A.	N.A.	36.9	407.8

Table: Progress of Iron and Steel Industry in India

[(Table Source:<http://www.yourarticlelibrary.com/industries/progress-of-iron-and-steel-industry-in-india/19709/>)]

Hence, it is imperative to concentrate on the areas in India where the minerals are available in abundance. Since, Nagpur division is moderately rich in minerals, the development of iron and steel industries in this region will definitely comprise lion's share in the overall growth of Indian iron and steel industry.

### **Iron and Steel Industry of Nagpur Division**

Iron ore and steel industry is one of the basic industries of the country and plays an important role in strengthening the economy. Delivering a talk on the 'Indian iron ore industry-an overview', CS Gundewar, Controller General, Indian Bureau of Mines said that India was the fourth largest producer of steel in the

world. Iron and steel was one of the largest industries supporting the country's economy. Gundewar was speaking at the National technology Day programme organised by the National Environmental Engineering Research Institute (NEERI), Nagpur. At present, India produces 65 million tonnes steel, but as per the 'National Steel Policy' country is expected to raise this production to 180 million tonnes by the year 2020. But this, he said, would be possible only by exploring new mines. Though India has large resources of iron ores with estimated capacity of 28.52 billion tonnes, magnetite reserves could not be exploited due to the presence of these ores in the 'eco-fragile' zones mainly in Western Ghats. Iron ore is found as hematite and magnetite in India in the ratio of 63:37. Gundewar also pointed out that consumption of iron ore (hematite) in iron and steel manufacturing in the country is only around 45-50% of the domestic production, whereas remaining iron ore is exported at present due to inadequacy of suitable agglomeration facilities (pelletisation in particular) in the country. [8]

As far as Vidarbha is concerned, geographically, it lies on the northern part of Deccan Plateau. Large basaltic rock formations exist throughout Vidarbha caused by the Deccan lava trap. Gondia district is unique in Maharashtra in the sense that the entire area of the district is occupied by metamorphic rock and alluvium. Buldhana has the Lonar crater created by impact of meteorite or comet. The eastern districts of Gondia, Bhandara, Gadchiroli and Nagpur fall in earthquake zone 1, which is considered safest in India, while other districts fall in zone 2.

Geographically, historically and according to political sentiments, Maharashtra has five main regions namely:

- Vidarbha - (Nagpur and Amravati divisions) - (Old Berar Region)
- Marathwada - (Aurangabad Division)
- Khandesh and Northern Maharashtra Region - (Nashik Division)
- Pune - (Pune Division)
- Konkan - (Konkan Division)

The iron and steel industries in Nagpur division includes the industries of the districts Bhandara, Chandrapur, Gadchiroli, Gondia, Nagpur and Wardha.

Nagpur district is moderately rich in minerals. Deposits of Coal, Manganese ore, Dolomite, Limestone, Iron Ore, Clay, Copper Ore, Chromites, Tungsten Ore, Zinc Ore, Lead Ore, Granite, Quartz etc. are found in the district. Coal reserves have been found in the North-West belt of the district i.e. from Saoner to Kanhan (Kamptee apart from the high coal found in Umrehtahsil). Nagpur district is richly endowed with Manganese Ore and the district is well placed in the country as far as production of Manganese ore is concerned. Manganese ore is found particularly in Ramtek and Saoner tahsils. Good quality limestone is found in Kandri and Deolapar, Mica and Tungsten is also found in the district. The sand from Kanhan River is considered to be of high quality as far as the construction of buildings is concerned. [9]

### **Conclusion:**

From the present research it is clear that the nation's economic growth is contingent upon the growth of India's vibrant Iron and Steel industry. The present research is an attempt to focus on the Iron and Steel industries of Nagpur Division. It is evident from the present research that Nagpur Division is moderately rich in minerals. The present research also highlights the importance of iron and other minerals that were known to the ancient people also.

Since Nagpur is rich in minerals, the development of iron and steel industries in this region will definitely comprise the lion's share in the overall growth of the nation's iron and steel industry. This growth in the iron and steel industry will definitely lead to the economic growth of the nation.

### **References**

[1] <http://www.preservearticles.com/2011101215225/essay-on-the-growth-of-iron-and-steel-industry-in-india.html>

- [2] <http://www.thecanadianencyclopedia.ca/en/article/iron-and-steel-industry>
- [3] <http://ispatguru.com/iron-and-steel-industry-in-ancient-india/>
- [4] <http://theviewspaper.net/india%E2%80%99s-economy-since-independence/>
- [5] <http://www.yourarticlelibrary.com/industries/progress-of-iron-and-steel-industry-in-india/19709/>
- [6] <http://steel.nic.in/Scheme%20for%20promotion%20of%20Research%20&%20Development%20in%20Indian%20Iron%20&%20Steel%20>
- [7] <http://business.mapsofindia.com/india-gdp/industries/iron-steel.html>
- [8] <http://timesofindia.indiatimes.com/business/india-business/Iron-and-steel-industries-are-economys-backbone/articleshow/20070310.cms>
- [9] <http://dcmsme.gov.in/dips/Nagpur%20dips%2012-13.pdf>