Chapter - 3
An overview of Indian Steel Industry

3.0 INTRODUCTION
3.1 WORLD STEEL INDUSTRY
3.2 INDIAN STEEL INDUSTRY
3.3 CHAPTER SUMMARY
REFERENCES
Chapter - 3

An Overview of Indian Steel Industry

3.0 INTRODUCTION

Steel is one of the world’s most essential materials. From infrastructure and transport to the tinned steel container that is used to preserve the food, steel is basic to every aspect of our lives. Steel is strong, versatile and most importantly, it is infinitely recyclable. Iron is the second most abundant metal on Earth, first being the Magnesium and is one of the oldest inventions in the history. It was first reported in 4000 BC. Steel is crucial for the development of any modern economy and works as backbone of human civilization. Steel is a cornerstone and key driver for the world’s economy (Walters, 2012). Per capita consumption of steel is used as an important index of the level of socio-economic development and living standards of the people in the country. All major industrial economies are characterized by the existence of a strong steel industry and the growth of many of these economies has been largely shaped by the strength of their steel industries in their initial stages of development (Barad, 2005).

3.0.1 Brief History of Steel

Although the rise of steel began in 19th century with Industrial Revolution in Europe and North America, steel making is not new. Ancient Chinese and Indians were skilled in its production. The industrialization of steel production in the 19th century has helped in building our modern world, but the origins of steelmaking go thousands of years back.

More than 4,000 years ago, people in Egypt and Mesopotamia discovered meteoric iron and considered that as gift of the gods. The world oldest steel known till yet is a 4000 years old piece of steel excavated in Kaman-Kalehuyok which is an archeological site in Turkey (“Ironware piece”, 2009). The earliest finds of smelted iron in India date back to 1800 BCE when the Hittites of Anatolia began iron smelting around1500 BCE (WSO, 2012). History of steel has its roots in the Iron Age, the period started after the Bronze Age period and characterized by prevalent use of
iron and steel. Although, the period of Iron Age has not been uniform for different region of the world, but Iron Age began after the collapse of Bronze Age around 1500 BC and last till 400 AD (“Iron age”, n.d.). However, iron is not steel. Iron Age metal worker discovered steel as an accidental by-product of their ironworking activities. These early smiths heated iron ore in charcoal fires, which produced a relatively pure spongy mass of iron called a ‘bloom’ that was hammered (wrought) into shape (WSO, 2012).

Early sub-Saharan Africans developed metallurgy at a very early stage, possibly even before other peoples, around 1400 BC. Steel was also used by Roman military in Roman Empire. An archaeological finding in Cyprus indicated that steel workers were producing quench hardened steel knives (A technique of rapid cooling of the worked steel in water or oil to increase its hardness) as early as 1100 BCE. Spartans also used steel for making their swords against their enemies equipped with only iron or bronze weapons and that was the secret of their supremacy from 700 BC to 400 BC (“Steel secret of Spartans”, 1961, O’connor, 2002).

In India, technique of producing high quality of steel was developed in southern India around 300 BC and the steel was known as wootz steel (Hirtz, 2010). From India, wootz steel was exported to ancient Europe and Arab world where it became famous, particularly in Middle East, where it was known as Damascus steel. Wootz steel and Damascus steel aroused curiosity among European scientific community from 17th century to 19th century, which played an important role in the development of modern English, French and Russian metallurgy (Smith, 1960)

Chinese craftsmen manufactured high-quality steel. Steel was created by Chinese people during the reign of Han dynasty in first century AD. They melted wrought iron and cast iron together to get intermediate carbon steel (Needham, 1986). Steel agricultural implements were widely used in the Tang Dynasty, around 600-900 CE.

With expertise in producing steel, traders in India and China created an international market for steel. Much of the demand for early steel was created by warfare. Armies of China, Greece, Persia and Rome, were eager for strong, durable weapons and armour. By the 15th century, steel got well established worldwide. But the use of steel was not confined to military purposes. Many tools such as axes, saws and chisels
began to incorporate steel tips to make them more durable and efficient (WSO, 2012). Yet, despite its growing use, making steel remained a slow, time-consuming and expensive process.

In the 17th century AD, a new process known as cementation process was used to produce steel in Europe but with time, cementation process for steel production became obsolete and in 1740, a young Englishman, named Benjamin Huntsman, revealed a new technique. Using a crucible, he was able to achieve temperatures to melt the bars created in the cementation process and cast the resulting liquid steel to create steel ingots of uniform high quality and in relatively high quantities (WSO, 2012).

Demand for iron and steel increased with the progress of Industrial Revolution. These metals were significant to trade and transport like railways and ship building. Henry Cort developed two ground-breaking techniques to meet these needs patented in 1783 and 1784 (WSO, 2012). By 1800s, large-scale industrialization was spreading throughout the Europe.

In the 1850s and 1860s, new techniques emerged that made mass production possible (WSO, 2012). According to Encyclopaedia Brittanica’s “Beesemer” entry (2016), this transformation is largely associated with the work of one English inventor, Henry Bessemer. Bessemer process was invented by Henry Bessemer in 1856. Before Bessemer process, production of steel was very expensive and steel was used only in expensive items like knives, swords and armours, but after the invention of Bessemer process, bulk and cheap production of steel became possible and steel began to be used in ship plate and railways, replacing the use of wrought iron. The Bessemer process remained the heart of steelmaking for more than 100 years (WSO, 2012). At the same time Carl Wilhelm Siemens, a German engineer, was developing regenerative furnace. Siemens’ process could generate temperatures high enough to melt steel. In 1865, a French man Pierre-Emile Martin applied Siemens’s technology to create Siemens-Martin open hearth process. Although, not quite as fast as the Bessemer process, open-hearth techniques allowed for more precise temperature control, resulting in the production of better-quality steel (WSO, 2012).
In just two decades, these inventors changed the shape of modern steel industry, which was providing consistently good quality steel in high volume, consistent shapes and sizes. Steel replaced the iron in the emerging railways and all kinds of construction from bridges to buildings. Steel enabled the manufacturing of large powerful turbines and generators and helped in harnessing the power of water and steam to lead the world into the age of electric power.

By the dawn of the 20th century, steel making was a major industry and science was increasingly unlocking the mysteries of steel (WSO, 2012). The 20th century's two world wars had huge consequences for steelmaking. Like many other industries, Steelmaking was nationalized in many countries due to demands for military equipments. Steel was required for the railways and ships that carried troops and supplies. Military vehicles also relied heavily on steel.

Steel played an important role in the post-war period. After Second World War, trade and industry revived and Steel began to meet consumer demand for automobiles and home appliances. Construction activities increased with the growth of population and huge quantities of steel were required for girder sand reinforced concrete (WSO, 2012).

After 1960s, open-hearth process was replaced by the basic oxygen process in the production of steel from iron ore and by the electric-arc furnace in the production of steel from scrap. Basic oxygen steelmaking and electric arc furnaces transformed the main production processes, making them faster and more energy efficient. They allowed manufacturers to re-use scrap as input material (Spoerl, n.d.).

3.1 WORLD STEEL INDUSTRY

Presently, world steel industry directly employs more than two million people worldwide with two million contractors and four million people working in supporting industries. Steel is supplied to industries such as automotive, construction, transport, power and machine goods. The steel industry is at the source of employment for more than 50 million people (WSO, n.d.). Production of World crude steel has almost became double from 851 MT in 2001 to 1,665 MT for the year 2014 and its production has increased manifolds as compare to its production in 1900 (28.3
World average of per capita steel consumption has increased from 150 kg in 2001 to 216.6 kg in 2014. India, Brazil, South Korea and Turkey have entered the top ten steel producers’ list during the past 40 years. The housing and construction sector is the largest consumer of steel, consuming around 50% of world steel production. The steel industry globally spends more than €12 billion annually on improving the manufacturing process, new product development and future breakthrough technology.

3.1.1 World Crude Steel Production

The figure for World crude steel production reached 1,665 million tonnes (Mt) for the year 2014, an increase of 1.2% on 2013. In 2014, the Middle East, which despite of being the smallest region for crude steel production, had the most robust growth. Crude steel production in the EU (28), North America and Asia grew moderately in 2014 as compared to 2013, while the crude steel production of C.I.S. and South America have declined in 2014. Figure 3.1 shows the trend of world crude steel production during the last decade.

![Figure 3.1: Trend of world crude steel production during 2005 & 2014](image)

Source: World Steel Association

World crude steel production has been in increasing trend during the last decade. The year on year growth rate for crude steel production has been positive in the last
decade except for two years 2008 and 2009. In 2005, World crude steel production increased by 8.0 percent as compared to the previous year while in 2006 the growth rate was 8.9 percent. In 2007, crude steel production became 1348 MT, an increase of 7.8 percent on 2006. In the years 2008 and 2009, Steel production declined in nearly all the major steel producing countries and regions. In the year 2008, there was a decline of 0.4 percent as compared to 2007, whereas in 2008 steel production declined by 7.8 percent as compared to 2008. All the major steel-producing countries and regions showed double-digit growth in 2010. Crude steel production showed a high growth rate of 15.7 percent in 2010. In 2011, world steel industry produced 1537 MT crude steel, an increase of 7.2 percent as compared to 2010. Growth rate of Steel Production declined during recent years. Steel production increased by 1.4 percent in 2012, by 3.0 percent in 2013 and by 1.2% in 2014 compared to their previous years. In the year 2015, steel production showed a negative growth rate of -2.8% compared to 2014.

### 3.2 INDIAN STEEL INDUSTRY

Steel has played a vital role in the development of modern human civilization. Steel plays a significant role especially in the development of developing economy. Per capita consumption of steel is used as an indicator of socio-economic development of the country as well as an indicator of standard of living of its people. Economic growth of India depends upon the growth of the Indian steel industry. Steel continues to be used in traditional sectors such as construction, housing and ground transportation, special steels has been increasingly used in engineering industries such as power generation, petrochemicals and fertilisers (Planning Commission, 2009). Currently, India is the 4th largest producer of crude steel in the world and is expected to become the 2nd largest producer of crude steel soon. The steel sector of India employs over six lakh of people & contributes nearly 2% in the country's GDP.

#### 3.2.1 Evolution and development of Indian Steel Industry

The history of steel-making in India can be traced back to 400 BC when the Indian archers, recruited by Greek emperors, used steel tipped arrows. More than Six thousand years old archaeological finds in Mesopotamia and Egypt are made up of steel. The Iron Pillar near Qutab Minar in Delhi, built between 350 and 380 A.D and
the famous Sun Temple at Konark in Orissa, built around 1200 AD, are the famous structures in India made up of steel (Ghosh, n.d.).

The use of iron in India goes back to the ancient era. Vedic literary sources such as the *Rig Veda*, the *Atharva Veda*, the *Puranas* and epics are rich with references of iron use in peace and war (SAIL, n.d.). Some of the milestones in iron and steel in Indian history are as follows.

**Table 3.1: Some milestones in iron and steel in Indian history**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>326 BC</td>
<td>Porus presented Alexander 30 lbs of Indian iron</td>
</tr>
<tr>
<td>300 BC</td>
<td>Kautilya (Chanakya) showed knowledge of minerals, including iron ores, and the art of extracting metals in 'Arthashastra'.</td>
</tr>
<tr>
<td>320 AD</td>
<td>A 16-meter Iron pillar erected at Dhar, ancient capital of Malwa (near Indore).</td>
</tr>
<tr>
<td>330-380 AD</td>
<td>Iron pillar in memory of Chandragupta II erected near Delhi. This solid shaft of wrought iron is about 8 meters in height and has diameter from 0.32 m to 0.46 m.</td>
</tr>
<tr>
<td>13th century</td>
<td>Massive iron beams used in the construction of the Sun temple, Konark</td>
</tr>
<tr>
<td>16th century</td>
<td>Indian steel known as 'Wootz' of watery appearance used in the Middle East and Europe</td>
</tr>
<tr>
<td>17th century</td>
<td>Manufacture of cannons, firearms and swords and agricultural implements 1830 Suspension bridge built over the Beas at Saugor with iron from Tendulkhma (MP). JM Heath built iron smelter at Porto Nova, Madras Presidency</td>
</tr>
<tr>
<td>1870</td>
<td>Bengal Iron works established at Kulti</td>
</tr>
<tr>
<td>1907</td>
<td>Tata Iron &amp; Steel Company formed</td>
</tr>
<tr>
<td>1953</td>
<td>Indian Government entered into agreement with Krupp Demag, Federal Republic of Germany to set up steel plant at Rourkela</td>
</tr>
<tr>
<td>1954</td>
<td>Hindustan Steel Limited formed to construct and manage three integrated steel plants at Rourkela, Durgapur and Bhilai</td>
</tr>
<tr>
<td>1956</td>
<td>Second Industrial Policy resolution vested the state with the exclusive responsibility for developing industries, including iron and steel, and the term Public Sector came into use for these</td>
</tr>
<tr>
<td>1960</td>
<td>Alloy steels plant installed at Durgapur</td>
</tr>
<tr>
<td>1965</td>
<td>Government of India signed agreement to establish steel plant at Bokaro</td>
</tr>
<tr>
<td>1973</td>
<td>Steel Authority of India Limited formed on 24th January</td>
</tr>
<tr>
<td>2006</td>
<td>IISCO merged with SAIL. Renamed IISCO Steel Plant.</td>
</tr>
</tbody>
</table>

*Sources: Steel Authority of India Limited*
In 1830, Joshua Marshall Heath, a foreigner, set up a small plant at Porto Novo on Madras Coast. But because of his expensive method and stiff competition from Bengal Iron works, it fell sick and was taken over by Bengal government and was renamed as Barakar Iron Works. Later, the plant was acquired by the Bengal Iron and Steel Company in 1889. The first notable attempt to revive steel industry in India was made in 1874 when the Bengal Iron Works (BIW) was established at Kulti in West Bengal which was taken over by Indian Iron and Steel Company (IISCO) in 1936 (Gosh, n.d.).

The modern steel Industry of India was started with the establishment of Tata Iron and Steel Company (TISCO) in 1907. TISCO was established by Jamsetji Nusserwanji Tata (Chand, n.d.). The company started large scale production of steel in India in 1912. By 1939, it was the largest steel plant in British Empire. After the establishments of TISCO, a few more steel companies were established. Mysore Iron and Steel Company, later renamed Vivesvaraya Iron & Steel Ltd, was established in 1923, Steel Corporation of Bengal (later renamed as Martin Burn Ltd and Indian Iron & Steel Ltd) was established in 1923 and Steel Corporation of Bengal, later renamed as Martin Burn Ltd and Indian Iron and Steel Co., was established in 1939. All these companies were in the private sector (Planning Commission, 2009).

In 1918, Indian Iron and Steel Company (IISCO) was established. It started production of pig iron at Burnpur in 1922. The Bengal Iron Works went into liquidation and merged with IISCO. The Steel Corporation of Bengal (SCOB) formed in 1937, started producing steel in Asansol. Later, SCOB was merged with IISCO in the year 1953 (Gosh, n.d.).

In 1947, when British colonial rule ended and India became independent, there were only three steel plants in India (the Tata Iron & Steel Company, the Indian Iron and Steel Company and Visveswaraya Iron & Steel Ltd) with a few electric arc furnace-based plants. Till 1947, India had a small steel industry in the country with a production capacity of about 1 million tonne (Ministry of steel, 2013).

The first industrial resolution in free India was adopted in 1948. The resolution officially accepted the principle of mixed economy. Under New Industrial Policy 1948, new undertakings in the iron and steel industry were reserved for the public
sector without disturbing the existing private players. India adopted its constitution in 1950 and planning commission was also constituted in the same year. The Industrial (Department and Regulation) Act (IDR Act), enacted in 1951, empowered the Government to take necessary steps to regulate the pattern of industrial development in the country and paved the way for the Industrial Policy Resolution of 1956. Industrial Policy Resolution 1956 was based on the Mahalanobis Model, which emphasized on heavy industries and process of industrialization as the means to achieve socialistic pattern of development. The Central government assumed direct responsibility for industrial development.

Then Prime Minister Jawaharlal Nehru, a believer in socialism, formed a government owned company named Hindustan Steel Limited (HSL) and set up three steel plants in 1950s. During the first three Five-Year Plans between 1952 and 1970, Government set up large integrated steel plants at Bhilai, Durgapur, Rourkela and Bokaro. The first plant was set up at Rourkela in Orissa. The second came up at Bhilai in Madhya Pradesh and the third at Durgapur in West Bengal. Each of these three plants had an initial production capacity of one million tonne ingot. Durgapur was followed by establishment of a steel plant at Bokaro in Bihar. The onward march of Indian steel did not stop at Bokaro. The fifth public sector steel plant was set up at Visakhapatnam in Andhra Pradesh.

- **New Industrial policy 1948 & Industrial policy resolution 1956**

In new industrial policy of 1948 and industrial policy resolution of 1956, emphasis was given on socialistic pattern of society and therefore iron and steel industry was imposed with certain controls (WBIDC, 2010). The steel industry remained in control regime, till the economic liberalization of 1990s.

1. Capacity control measures,
2. Dual pricing System,
3. Quantitative restrictions and high tariff barriers,
4. Railway freight equalization,
5. Control on import of inputs.
In a decade, crude steel production in India grew to nearly 15 million tonnes from only 1 million tonne in 1947 and India became 10th largest producer of steel in the world. But the steel industry of India could not sustain the trend of steel production from the late 1970’s onwards and the economic slowdown adversely affected the growth of the Indian steel industry. In 1991-92, the control regime was replaced by liberalization and deregulation in the form of New Industrial policy 1991.

- New industrial policy 1991

The provisions of the New Economic Policy of 1990’s impacted the steel industry of India in following ways (Ministry of Steel, 2006):

1. Iron and steel industry was removed from the list of industries reserved for the public sector and was exempted from the provisions of compulsory licensing under the Industries (Development and Regulation) Act, 1951.
2. Iron and steel industry was included in the list of ‘high priority’ industries for automatic approval for foreign equity investment up to 51% which has increased to 100% since then.
3. Pricing and distribution of steel were deregulated, ensuring the priority for meeting the requirements of small scale industries, exporters of engineering goods and North Eastern Region, besides strategic sectors such as Defense and Railways.
4. Iron and steel import was liberalized by removal of import licensing, foreign exchange release and lowering of import duty.
5. Export of iron and steel items has also been freely allowed.
6. Import duty on capital goods and raw materials for steel production were reduced.
7. Freight equalization scheme was withdrawn.

After the economic reform, Indian economy opened up new channels for steel manufacturers. Globalization of the economy helped them in procuring raw materials and other inputs at competitive rates from overseas markets and in finding new markets for their products. It also helped in understanding the global operations/techniques of steel manufacturing. Domestic players enhanced their efficiency to become internationally competitive. It is also good for the consumers as
the steel consumer can now choose items from domestic and imported manufactured steel.

With the rapid growth of Indian steel industry and its integration with global industry there was a need for a roadmap of growth and development of Indian steel industry which induced the government to introduced National steel policy (NSP) in November 2005.

- **National Steel Policy (NSP) 2005**

The main aim of National Steel Policy was to make Indian steel industry as self reliant internationally competitive industry and to established Indian steel industry as a modern and efficient steel industry that can cater diversified steel demand. NSP 2005 aimed to remove the bottlenecks in the availability of inputs, investment in research & development and development of infrastructure. The policy envisages steel production to reach at 110 MT by 2019-20 with annual growth rate of 7.3 percent (Ministry of steel, 2005).

- **National Steel Policy 2012**

The National Steel Policy 2005 was formulated when the Indian steel industry was moving with high growth rate showing promises of a significant resurgence. However, the Indian economy experienced a paradigm shift with the actual performance of the economy with the Indian steel industry surpassing the projected levels of performance. Steel consumption grew by 10% per annum from 2005-06 to 2011-12 with growth in the production at an annual rate of 7.8% during the same period thereby surpassing the NSP 2005 projections by a significant margin. Therefore, National Steel Policy was needed to be dynamic. Taking into consideration the changing needs of the industry in view of significant changes in the domestic and global economic environment, the Government of India decided to formulate National Steel Policy 2012 (NSP 2012) to reach crude steel production capacity level of 300 million tonnes by 2025-26 and to meet the domestic demand fully and to achieve a projected production level of 275 million tonnes by 2025-26 (Ministry of Steel, 2012).
3.2.2 Global status of Indian Steel Industry

Indian Iron and steel industry contributes appreciably to overall growth and development of the economy. Indian Steel Industry today directly contributes two percent of India’s Gross Domestic Product (GDP) and its weightage in the official Index of Industrial Production (IIP) is 6.2 per cent (Working committee report 2011-17). Globally, India has become the world’s fourth largest producer of crude steel preceded only by China, Japan and USA.

**Figure 3.2: Share of India in world crude steel production in 2014**

![Pie chart showing the share of top ten countries in world crude steel production in 2014.](image)

*Source: World Steel Association*

*Noted: ROW = Rest of the world*

Figure 3.2 shows the share of top ten countries in world crude steel production in 2014. The countries like China, Japan, India and South Korea are the top steel producers among the Asian countries. China has been the largest crude steel producer in 2014 with a share of 49.50 % in world crude steel production while India was the fourth largest producer of crude steel in 2014 with a share of 5.0 % in world crude steel production preceded by South Korea (16.60 %), Japan (6.7 %) and USA (5.30 %).
Comparing world crude steel production in 2013 and 2014 (see appendix 1), annual crude steel production for Asia was 1,132.3 MT in 2014, an increase of 1.4% compared to 2013. It can be seen that in 2014, crude steel production of China (822.7 MT) was increased by 0.9% compared to 2013. In 2014, crude steel production of Japan (110.7 MT) was up by 0.1% compared to 2013. Crude steel production of US reached 88.3, an increase of 1.7% on 2013. In 2014, production of crude steel in India (83.2 MT) was up by 2.3% compared to 2013. South Korea produced 71.0 MT Crude steel in 2014, an increase of 7.5% compared to 2013. Crude steel production of Russia (70.7 MT) was increased by 2.6% in 2014 compared to its production in 2013. The Crude steel production of Germany was increased by 0.7% in 2014 compared to 2013. Turkey, Brazil and Ukrain are among the major producing countries that showed decline in the production of crude steel in 2014.

**Figure 3.3: Country wise per capita steel consumption in 2013 & 2014**

![Graph showing per capita steel consumption for various countries](image)

*Source: World Steel Association*

As depicted in figure 3.3, (appendix 1) despite of being fourth largest producers of crude steel in the world, India lagged behind other major steel producing countries in terms of per capita consumption of steel. In 2014 per capita consumption of steel in
India was only 59.4 kg against the world average of 216.6 kg. According to World steel Association, Global per capita steel consumption was 216.6 kg in 2014, a decline of 0.6 percent compared to per capita steel consumption in 2013 (217.8 kg). Among larger economies, China’s per capita steel consumption was 510.0 kg in 2014 as compared to 530.6 kg in 2013 while EU showed an increase of 4.3 percent in per capita steel consumption in 2014 as compared to 2013. Per capita steel consumption of Taiwan was 837.1 kg in 2014, an increase of 5.6 percent compared to 2013. South Korea with a per capita consumption of 1118.8 kg, showed a 6.5 percent increase in per capita steel consumption and remains at top in per capita steel consumption in 2014. South Korea consumed more than double of China’s per capita steel consumption in 2014. USA showed most robust growth in per capita steel consumption in 2014 (10.8%) while Canada per capita consumption (428.5kg) was up by 7.0 percent in 2014 compared to 2013. Per capita steel consumption of Russia was 302.8 kg, a decline of 1.2 percent compared to 2013. Japan’s per capita steel consumption was 531.7 kg in 2014. India’s per capita steel consumption was 59.4 kg in 2014, a growth of 600 gm compared to 2013. In 2014, India’s steel consumption grew by just 1.0 percent compared to 2013 due to slow growth in domestic economy.

3.2.3 Steel production and consumption in India

Crude steel production in India showed high growth rate during 10th five year plan. The first year of the 11th Plan i.e. 2007-08 had also been a year of high growth for the industry, but because of global economic crises, the industry could not maintained high growth rate in subsequent years. Steel Industry, like other manufacturing sectors, is market driven and therefore, has affected by the adverse global market conditions. But with timely policy interventions and stimulus of fiscal and monetary packages, industry showed sign of recovery in production and consumption (Working committee report 2012-17).

Table - 3.2 depicts production of finished steel for sale in India. Production for sale of total finished steel (alloy + non alloy) was 85.054 MT in 2013-14 as compared to 81.68 MT in 2012-13. The share of secondary producers (major and other producers) was 85.2 percent in 2013-14. This high share of secondary producer in total finished steel production for sale was mainly due to availability of raw materials, expansion of
capacities and emergence of new units in these segments. Production of finished steel for sale has been continuously increasing in India.

Table 3.2: Total production of steel in India (alloy and non-alloy)

<table>
<thead>
<tr>
<th>Year</th>
<th>Main producer</th>
<th>Secondary producer</th>
<th>Less IPT/Own Consumption</th>
<th>Total (Finished Steel)</th>
<th>% Share of Secondary Producers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-04</td>
<td>15.383</td>
<td>27.966</td>
<td>2.640</td>
<td>40.709</td>
<td>60.8</td>
</tr>
<tr>
<td>2004-05</td>
<td>15.824</td>
<td>31.041</td>
<td>3.352</td>
<td>43.513</td>
<td>71.3</td>
</tr>
<tr>
<td>2005-06</td>
<td>16.413</td>
<td>34.809</td>
<td>4.656</td>
<td>46.566</td>
<td>74.8</td>
</tr>
<tr>
<td>2006-07</td>
<td>17.614</td>
<td>40.047</td>
<td>5.132</td>
<td>52.529</td>
<td>76.2</td>
</tr>
<tr>
<td>2007-08</td>
<td>18.020</td>
<td>43.332</td>
<td>5.277</td>
<td>56.075</td>
<td>77.3</td>
</tr>
<tr>
<td>2008-09</td>
<td>17.216</td>
<td>46.229</td>
<td>6.281</td>
<td>57.164</td>
<td>80.9</td>
</tr>
<tr>
<td>2009-10</td>
<td>18.038</td>
<td>51.093</td>
<td>8.507</td>
<td>60.624</td>
<td>84.3</td>
</tr>
<tr>
<td>2010-11</td>
<td>18.407</td>
<td>57.890</td>
<td>7.676</td>
<td>68.621</td>
<td>84.4</td>
</tr>
<tr>
<td>2011-12</td>
<td>17.978</td>
<td>66.426</td>
<td>8.708</td>
<td>75.696</td>
<td>87.8</td>
</tr>
<tr>
<td>2012-13</td>
<td>19.244</td>
<td>70.376</td>
<td>7.940</td>
<td>81.680</td>
<td>86.2</td>
</tr>
<tr>
<td>2013-14</td>
<td>21.099</td>
<td>72.442</td>
<td>8.487</td>
<td>85.054</td>
<td>85.2</td>
</tr>
</tbody>
</table>

Source: Various Annual reports, Ministry of Steel, (GOI)

In 2003-04, its production was 40.709 MT with 60.8 percent share of secondary producer in total finished steel production. In 2005-06, production increased to 46.566 MT compared to 43.513 MT in 2004-05. In 2006-07, total finished steel production reached 52.529 MT and in 2007-08, it increased to become 56.075 MT. Further, production of finished steel for sale increased to become 57.164 MT in 2008-09 and 60.624 MT in 2009-10. In 2010-11, total finished steel production for sale was 68.621 MT which further rose to 75.696 MT in 2011-12.
Table 3.3: Crude Steel Production in Public and Private Sector in India

(in million tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Public sector</th>
<th>Private sector</th>
<th>Total production</th>
<th>Share of public sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-04</td>
<td>15.788</td>
<td>22.939</td>
<td>38.727</td>
<td>41 %</td>
</tr>
<tr>
<td>2004-05</td>
<td>15.912</td>
<td>27.525</td>
<td>43.437</td>
<td>36 %</td>
</tr>
<tr>
<td>2005-06</td>
<td>16.964</td>
<td>29.496</td>
<td>46.46</td>
<td>36 %</td>
</tr>
<tr>
<td>2006-07</td>
<td>17.003</td>
<td>33.814</td>
<td>50.817</td>
<td>33 %</td>
</tr>
<tr>
<td>2007-08</td>
<td>17.09</td>
<td>36.77</td>
<td>53.86</td>
<td>32 %</td>
</tr>
<tr>
<td>2008-09</td>
<td>16.37</td>
<td>42.07</td>
<td>58.44</td>
<td>28 %</td>
</tr>
<tr>
<td>2009-10</td>
<td>16.71</td>
<td>49.13</td>
<td>65.84</td>
<td>25 %</td>
</tr>
<tr>
<td>2010-11</td>
<td>16.99</td>
<td>53.68</td>
<td>70.67</td>
<td>24 %</td>
</tr>
<tr>
<td>2011-12</td>
<td>16.48</td>
<td>57.81</td>
<td>74.29</td>
<td>22 %</td>
</tr>
<tr>
<td>2012-13</td>
<td>16.48</td>
<td>61.94</td>
<td>78.42</td>
<td>21 %</td>
</tr>
<tr>
<td>2013-14</td>
<td>16.77</td>
<td>64.92</td>
<td>81.69</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Source: Various Annual Reports, Ministry of Steel, (GOI)*

The table 3.3 highlights the total production of crude steel in India by both private and public sector. Table 3.3 shows increasing trend in the production of crude steel in India during last decades. The production of crude steel in India has increased from 38.727 MT in 2003-04 to 81.69 MT in 2013-14. But there has been a continuous decrease in share of crude steel production of public sector during the last decade. Public sector produced 15.788 MT of crude steel with market share of 41 percent in 2003-04. The production of crude steel by public sector has increased to become 16.77 MT in 2013-14 but the share of public sector in total production of crude steel has reduced to 21 percent in 2013-14. Hence, it can be concluded that private sector of steel industry in India is currently playing an important role in production and growth of steel industry in India and the share of public sector in crude steel production has declined compared to the private sector.
Table 3.4: Installed capacity, Production and utilization of capacity of crude steel in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (in million tonnes)</th>
<th>Production (in million tonnes)</th>
<th>Capacity utilization (in Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>47.995</td>
<td>43.437</td>
<td>88</td>
</tr>
<tr>
<td>2005-06</td>
<td>51.171</td>
<td>46.460</td>
<td>91</td>
</tr>
<tr>
<td>2006-07</td>
<td>56.843</td>
<td>50.817</td>
<td>89</td>
</tr>
<tr>
<td>2007-08</td>
<td>59.85</td>
<td>53.86</td>
<td>90</td>
</tr>
<tr>
<td>2008-09</td>
<td>66.34</td>
<td>58.44</td>
<td>88</td>
</tr>
<tr>
<td>2009-10</td>
<td>75.00</td>
<td>65.84</td>
<td>88</td>
</tr>
<tr>
<td>2010-11</td>
<td>80.36</td>
<td>70.67</td>
<td>89</td>
</tr>
<tr>
<td>2011-12</td>
<td>90.87</td>
<td>74.29</td>
<td>82</td>
</tr>
<tr>
<td>2012-13</td>
<td>97.02</td>
<td>78.42</td>
<td>81</td>
</tr>
<tr>
<td>2013-14</td>
<td>101.02</td>
<td>81.69</td>
<td>81</td>
</tr>
</tbody>
</table>

Sources: Various Annual reports, Ministry of Steel, (GOI)

Crude steel production and capacity utilization are given in the table 3.4. The capacity utilization rate is a key indicator of the steel industry’s health. Capacity utilization means actual production as compared to the maximum production possible using existing plants. Crude steel production has shown a sustained rise since 2004-05 along with capacity. India has become the fourth largest producer of crude steel in the world in 2014, based on ranking released by World Steel Association. This growth has been driven by capacity expansion from 47.995 million tonnes in 2004-05 to 101.02 million tonnes in 2013-14. The production of crude steel in India shows constant rise with the rise in installed capacity of production. Crude steel production was 43.437 MT in 2004-05 with installed capacity of 47.995 MT, utilization of 88 percent of capacity. In 2005-06, crude steel production rose to 46.46 MT with 51.171 MT capacity and 91 percent capacity utilization. In 2006-07, capacity utilization ratio fell to 89 percent but crude steel production rose to 50.817 MT with a production capacity of 56.843 MT. In 2007-08 crude steel production increase to 53.86 MT with installed capacity increase to 59.75 MT utilizing 90 percent capacity. In 2008-09 production reached to 58.44 MT with 66.34 MT installed capacity but capacity utilization ratio fell to 88 percent. In 2009-10, capacity utilization ratio was at same level of 88 percent, but crude steel production increased to 65.84 MT and capacity increased to 75.0 MT. In 2010-11 production capacity reached the level of 80.36 MT and India produced 70.67 MT of crude steel utilizing 89 percent of capacity. In 2011-12,
capacity utilization rate fell to 82 percent but capacity and production increased to 90.87 MT and 74.29 MT respectively. In 2012-13, capacity utilization rate further fell to the level of 81 percent but production capacity increased to 97.02 MT producing 78.42 MT of crude steel.

Real Consumption of steel is obtained from apparent consumption (i.e. production + imports – exports +/- variation in stocks) of total finished steel after adjusting for double counting in flat products (Ministry of steel, GOI). The year-wise trend in real consumption of total finished steel is shown in table 3.5.

The apparent consumption of finished steel is given in table 3.5. Apparent consumption of steel in India has been in increasing trend during the last decade. Domestic Real consumption of steel was 36.38 MT in 2004-05. Domestic real steel consumption was grew by 13.88 percent in the year 2005-06 compared to previous year to become 41.43 MT. In 2006-07, it further grew by 12.91 percent with a consumption of 46.78 MT. In 2007-08, real steel consumption was 52.12 MT, an increase of 11.42 percent on previous fiscal year.

### Table 3.5: Apparent Consumption of Finished Steel in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Production for sale</th>
<th>Import</th>
<th>Export</th>
<th>Apparent consumption</th>
<th>Growth rate (Consumption)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>38.99</td>
<td>2.29</td>
<td>4.7</td>
<td>36.38</td>
<td>9.84</td>
</tr>
<tr>
<td>2005-06</td>
<td>42.16</td>
<td>4.31</td>
<td>4.81</td>
<td>41.43</td>
<td>13.88</td>
</tr>
<tr>
<td>2006-07</td>
<td>49.58</td>
<td>4.93</td>
<td>5.24</td>
<td>46.78</td>
<td>12.91</td>
</tr>
<tr>
<td>2007-08</td>
<td>56.08</td>
<td>7.03</td>
<td>5.08</td>
<td>52.12</td>
<td>11.42</td>
</tr>
<tr>
<td>2008-09</td>
<td>57.16</td>
<td>5.84</td>
<td>4.44</td>
<td>52.35</td>
<td>0.44</td>
</tr>
<tr>
<td>2009-10</td>
<td>60.62</td>
<td>7.38</td>
<td>3.25</td>
<td>59.34</td>
<td>13.35</td>
</tr>
<tr>
<td>2010-11</td>
<td>68.62</td>
<td>6.66</td>
<td>3.64</td>
<td>66.42</td>
<td>11.93</td>
</tr>
<tr>
<td>2011-12</td>
<td>75.69</td>
<td>6.86</td>
<td>4.59</td>
<td>71.02</td>
<td>6.92</td>
</tr>
<tr>
<td>2012-13</td>
<td>81.68</td>
<td>7.93</td>
<td>5.37</td>
<td>73.48</td>
<td>3.46</td>
</tr>
<tr>
<td>2013-14</td>
<td>87.67</td>
<td>5.45</td>
<td>5.98</td>
<td>74.09</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Source: Various Annual reports ministry of steel (GOI)

In 2008-09, domestic real consumption grew just by 0.44 percent to become 52.35 MT. The low growth rate in 2008-09 was due to world economic crises that started in October 2008. With the recovery from the crises, domestic steel consumption increased by 13.35 percent in 2009-10 and reached the level of 59.34 MT. Further, it
increased by 11.93 percent in 2010-11 to become 66.42 MT. Domestic real steel consumption’s growth started to decline in 2011-12 and India’s steel consumption grew by just 0.6% in 2013-14, lowest in five years, to become 73.89 MT. The growth in real steel consumption was mainly impacted by a slower expansion of the domestic economy.

**3.2.4 Export and Import of steel from India**

Iron and steel products are importable freely as per the extant policy. Advance licensing scheme allow duty free import of raw material for export. Iron and steel are freely exportable. Duty entitlement pass book scheme was introduced to facilitate exports. Under this scheme exports based on notified entitlement rate, are granted due credit which would entitle them to import duty free good. The benefit on export of various categories of steel items scheme is currently applicable for steel exports.

Steel imports have increased in India due to deregulation and reduction in import duties on steel imports, surge in domestic demand and reduction in price differential between imported steel and domestic steel. Import volumes have been fluctuating during the last decades. Liberalization and free trade policy helped in growth of steel exports from India. Steel exports from India were declined during 2008 and 2011 due to decrease in demand of steel globally.

Table 3.6: Export and Import of steel from India (in million tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Import</th>
<th>% Growth</th>
<th>Export</th>
<th>% Growth</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-2005</td>
<td>2.29</td>
<td></td>
<td>4.70</td>
<td></td>
<td>Export</td>
</tr>
<tr>
<td>2005-2006</td>
<td>4.31</td>
<td>88.2</td>
<td>4.81</td>
<td>2.3</td>
<td>Export</td>
</tr>
<tr>
<td>2006-2007</td>
<td>4.93</td>
<td>14.4</td>
<td>5.24</td>
<td>8.9</td>
<td>Export</td>
</tr>
<tr>
<td>2007-2008</td>
<td>7.03</td>
<td>42.6</td>
<td>5.08</td>
<td>-3.1</td>
<td>Import</td>
</tr>
<tr>
<td>2008-2009</td>
<td>5.84</td>
<td>-16.9</td>
<td>4.44</td>
<td>-12.6</td>
<td>Import</td>
</tr>
<tr>
<td>2009-2010</td>
<td>7.38</td>
<td>26.4</td>
<td>3.25</td>
<td>-26.8</td>
<td>Import</td>
</tr>
<tr>
<td>2010-2011</td>
<td>6.66</td>
<td>-9.7</td>
<td>3.64</td>
<td>12.0</td>
<td>Import</td>
</tr>
<tr>
<td>2011-2012</td>
<td>6.86</td>
<td>3.0</td>
<td>4.59</td>
<td>26.1</td>
<td>Import</td>
</tr>
<tr>
<td>2012-2013</td>
<td>7.93</td>
<td>15.6</td>
<td>5.37</td>
<td>17.0</td>
<td>Import</td>
</tr>
<tr>
<td>2013-2014</td>
<td>5.45</td>
<td>-31.2</td>
<td>5.98</td>
<td>11.4</td>
<td>Export</td>
</tr>
<tr>
<td>2014-2015</td>
<td>9.32</td>
<td>71.0</td>
<td>5.59</td>
<td>-6.5</td>
<td>Import</td>
</tr>
</tbody>
</table>

*Source: Various Annual Reports, Ministry of Steel (GOI)*

Table 3.6 explains imports and exports of steel in India. India has been a net importer of steel for most of the years during last decades. From 2004-05 to 2006-07, India has
been a net exporter of steel as during these years steel exports was more than steel imports. From 2007-08 to 2014-15, India has been a net steel importer except for the year 2013-14. During these years India’s import of steel was more than its exports. In 2007-08, India’s steel imports stood at 7.03 MT, an increase of 42.6 percent as compared to 2006-07 while exports stood at 5.08 MT, a decrease of 3.1 percent on 2006-07. In 2008-09, a decline of 16.9 percent and 12.6 percent were recorded in steel imports and exports, respectively. In 2009-10, India’s steel imports increased to 7.38 MT but exports decline to 3.25 MT. In 2010-11, total steel imports were 6.66 MT, a decline of 9.7 percent on previous fiscal while the exports stood at 3.64 MT. In 2011-12, steel imports in the country became 6.86 MT and exports became 4.59 MT. In 2012-13, steel imports in India became 7.93 MT and its export stood at 5.37 MT. India became net steel exporter in 2013-14 after a period of six years. Total steel exports by India during fiscal 2013-14 stood at 5.98 MT as against imports of 5.45 MT. About 11.4 percent higher exports and 31.3 percent decline in imports helped India to become net exporter of steel. Higher exports were driven by mismatched demand supply situation in the country and imports were lower mainly due to slowdown in the domestic economy.

3.2.5 Prospects for Demand and supply of steel in India

The Indian steel industry entered into a new development stage from the year 2007-08 with rising demand for steel. Because of Rapid rise in production of steel, India is now the 4th largest producer of crude steel and the largest producer of sponge iron or DRI in the world (MOS, 2015). As per the forecast of World Steel Association, India’s steel demand is expected to grow by 3.4% to 76.2 Mt, following a growth of 1.8% in 2013. Further, structural reforms and improving confidence will support a 6% growth in Indian steel demand in the year 2015 but prominent inflation and fiscal consolidation will remain key difficulty for the projected growth rate (WSO, 2014).

According to the report of the Working Group on Steel for the 12th Five Year Plan, many factors can raise the per capita steel consumption in the country like an estimated infrastructure investment of nearly a trillion dollars, a projected growth of manufacturing from current 8% to 11-12%, increase in urban population to 600 million by 2030 from the current level of 400 million, emergence of the rural market for steel currently consuming around 10 kg per annum. Total domestic demand for
Chapter 3

An Overview of Indian Steel Industry

steel will increase from 65.61 million tonnes in 2010-11 to 113.3 million tonnes in 2016-17 while the production will increase from 62.27 million tonnes in 2010-11 to 115.3 million tonnes in 2016-17 (Ministry of Steel, 2011). In National Steel Policy 2005, production was projected to reach 110 million tonnes by 2019-20 (Ministry of steel, 2005). However, the National Steel Policy 2005 was formulated when the Indian steel industry was moving with high growth rate but in later years the Indian economy experienced a paradigm shift with the actual performance of the economy with Indian steel industry surpassing the projected levels of performance. Therefore, the Government of India, decided to formulate National Steel Policy, 2012 (NSP 2012) to reach crude steel capacity level of 300 million tonnes by 2025-26 to meet the domestic demand fully and a projected production level of 275 million tonnes by 2025-26 (Ministry of Steel, 2012). Based on the assessment of the current ongoing projects, both in greenfield and brownfield, the Working Group on Steel for the 12th Five Year Plan has projected that domestic crude steel capacity in the county is likely to be 140 Mt by 2016-17 and has the potential to reach 149 Mt if all requirements are adequately met. According to the Ministry of Steel (2015), during 12th Five Year Plan (2012-2017), domestic demand of total finished steel is likely to grow at an annual average growth rate of over 10% as compared to the average annual growth rate of 8% between 1991-92 and 2010-11.

3.2.6 Major players in steel industry in India

3.2.6.1 Public Sector

- *Rashtriya Ispat Nigam Ltd. (RINL)*

Rashtriya Ispat Nigam Ltd. (RINL) is the corporate entity of Visakhapatnam Steel Plant popularly known as Vizag steel. It is a Navratna Public sector enterprise. It is the first shore based integrated steel plant located at Visakhapatnam in Andhra Pradesh. A market leader in long steel products, it is catering the need of construction, automobiles, engineering and fabrication sectors. The plant, with a capacity of producing 3 Million tonnes of steel per annum, was commissioned in 1992. Now the company is about to increase its capacity to 6.3 million tonnes per annum. The plant adopted all international standards for energy saving and pollution control measures. From the beginning of its operation, VSP has been recognized in the domestic as well
in international markets because of its superior quality of products. A pioneer in the steel industry, The company has been accredited all the three International standards certificates, ISO 9001:2000, ISO 14001: 1996 and OHSAS 18001: 1999. It is the first Indian integrated steel plant which is certified with ISO 50001 standards for Energy Management system. The Ministry of Steel, Govt. of India gave the prestigious status of Mini Ratna to the company in 2006 and RINL has prepared a road map to expand the plant’s capacity up to 16 million tonnes per annum in phases. The plant has been Operating at high level of operational efficiency and continuously earning profit for last several years. The company is working as a good corporate citizen and has contributed substantially for the development of the region.

- **National Mineral Development Corporation Limited (NMDC Ltd)**

NMDC Ltd is a government of India fully owned public enterprise. It was founded in 1958 under the administrative control of the ministry of Steel, Government of India. Currently, it produces around 30 million tonnes of iron ore from three fully mechanized mines that is Bailadila Deposit-14/11C, Bailadila Deposit-5, 10/11A in Chhattisgarh State and Donimalai Iron Ore Mines in Karnataka State with ISO 9001: 2008 - QMS Certification for all its iron ore mines and R&D Centre, ISO 14001:2004 - EMS Certification for all its production mines and OHSAS 18001:2007 - OHMS Certification for all its production mines. NMDC is India’s single largest iron ore producer. NMDC has been accorded the status of schedule-A public sector company. It has been categorized as "NAVRA7NA" Public Sector Enterprise in 2008 by the Department of Public Enterprises for its growing status and consistent excellent performance. Bailadila complex has world's best grade of hard lumpy ore having more than 66% iron content with the best physical and metallurgical properties required for steel making. NMDC had developed many mines like Kiriburu, Meghabitaburu iron ore mines in Bihar, Khetri Copper deposit in Rajasthan, Kudremukh Iron Ore Mine in Karnataka, Phosphate deposit in Mussorie, some of which were later handed over to other companies in public sector and others became independent companies. NMDC is presently producing about 22 million tonnes of iron ore from its Bailadila sector mines and 7 million tonnes from Donimalai sector mines. Bailadila is an important supplier of raw material to Essar steel, ISPAT industries, Vikram Ispat and Visakhapatnam Steel Plant. NMDC is increasing
production capacity of existing mines and opening up new mines to meet the expected increase in demand, the production capability would increase to 50 million tonnes (approx.) per year in coming years. Apart from iron ore NMDC is developing Magnesite mine in Jammu and Arki Lime Stone Project in Himachal Pradesh. NMDC is also developing a 3 million tonnes per annum steel plant at Jagdalpur and 2 pellet plants at Donimalai with capacity 1.2 mtpa and at Bacheli with capacity 2 mtpa. NMDC has also acquired Sponge Iron India Limited for expansion to produce billets. NMDC also plans to go for other minerals like Coal, Diamond, gold etc. NMDC has set a Global Exploration Centre at Raipur, Chhattisgarh for the exploration activities. A Wind mill project of 10.5MW capacity has been completed in Karnataka by NMDC as renewable energy resources. The CSR Policy of NMDC has a holistic triple bottom line approach benefitting the company and the society with CSR initiatives in the areas of Medicare, education, skill training, infrastructure, drinking water, etc. Department of Public Enterprises (DPE), Ministry of Heavy Industries and Public Enterprises, New Delhi has suggested the PSEs to follow NMDC CSR model for effective CSR activities.

- **Ferro Scrap Nigam Limited (FSNL)**

FSNL was established in the year 1979 as a government of India Company. The main business of the company is recovering and processing of scrap in the integrated steel plants. FSCL was originally an American company named Heckett Engineering which commenced its operation in 1956. Later in 1956 because of foreign exchange regulation act, a new company Ferro Scrap Nigam Limited was founded which take over the business of Heckett engineering with 60% of the equity contributed by MSTC and 40% by Heckett engineering. FSNL became wholly owned subsidiary of MSTC in 2002. At present the company has ten steel plants in India. It has diversified into marketing of heavy earthmoving equipment products, R & D consultancy, mining and civil structural contracts, central workshops and renewable energy to make company globally competitive.

- **Kudremukh Iron Ore Company Ltd (KIOCL Ltd)**

KIOCL Ltd was established in the year 1976. It is a 100% export oriented unit under the ministry of steel, government of India. The Company has its registered office in
Bangalore. It also has status of Mini Ratna. Company has an iron oxide pellet plant and a blast furnace unit in Mangalore, Karnataka. The company is in the business of producing and exporting high quality iron oxide pellets and supply of pig iron for domestic market. It is ISO-9001:2008 certified for quality of its product and ISO-14001:2004 certified for occupational health and safety management system. The annual capacity of the pellet plant is to produce 3.5 million tonnes of pellets and blast furnace unit produces 2.16 lakh tonnes of foundry grade pig iron. It has awarded with MOU award for the year 1999-2000 and 2000-01 for achieving excellent rating in achieving MOU targets for these years. The company has been conferred with many awards in different fields like environmental conservation and rational utilization of natural resources, export best performance, excellent organization, energy conservation, pollution control etc, the company also contribute to the development of the society by its CSR activities like socio-economic, educational and health initiatives. The company has many future projects for implementation for growth of the company like an integrated steel plant and mining lease in Karnataka, solar power generation, etc

3.2.6.2 Private sector

- Tata Steel Ltd.

Tata steel was established in 1907 by Jamshedji Ratan Tata. It has it’s headquarter in Jamshedpur in Jharkhand. Tata steel group is among the top ten steel manufacturers in the world. Currently it is operating in more than 26 countries and has its commercial presence in 50 countries. It is the second most geographically diversified steel manufacturer in the world. The company has a capacity of producing over 29 million tonnes of crude steel per annum. The company has more than 80,000 employees working with it across five continents. The Tata steel group had a turnover of Rs. 148614 crores in financial year 2014 and has been successful in securing a place in fortune 500 company. The group has the vision to be the world’s industry standard in value creation and corporate citizenship. With its subsidiaries, joint ventures and associates, Tata steel groups have expanded its operation in many countries. The company has manufacturing units and marketing networks in Europe, Southeast Asia and Pacific Rim countries with bigger manufacturing facilities in India, The United
Chapter – 3  An Overview of Indian Steel Industry

Kingdom, The Netherland, Thailand, Singapore, China and Australia. The companies within the Tata steel Group are Tata Steel Limited India, Tata Steel Europe Limited, Tata Steel Singapore and Tata Steel Thailand. Tata Steel India awarded The Deming application prize for 2008 for excellence in total quality management and in 2012 awarded with The Deming Grand prize 2012, instituted by Union of Japanese scientists and engineers and Tata steel India became first integrated steel plant outside Japan to be awarded with these Prizes.

- **Essar Steel Ltd.**

Essar steel is a global integrated steel producer founded in 1998. Essar Steel is one of the leaders in India and abroad in the steel sector. It is part of the Essar Group with its head office in Mumbai. It has a capacity of 14 million tonnes per annum. It has a strong presence in steel consuming market of Asia and North America. It is operated in four countries, it operates in India with a integrated facility of 10 million tonnes per annum, it operates in Canada with a steel plant of capacity of 4 million tonnes per annum, it has a Taconite plant under execution in USA with 7 million tonnes per annum capacity and it has a 0.4 million tonnes per annum downstream complex in Indonesia. Essar Steel India is an integrated steel manufacturer. It has a capacity of producing 10 million tonnes per annum. Essar steel produces over 300 grade of steel according to the quality standards of international certification agencies like API, ABS and NACE etc. also Information technology is used extensively in the operations to ensure consistent quality of its product. The steel plant located at Haziro has modern infrastructure like a power plant and a port that can handle 30 million tonnes cargo annually. Essar steel has set up a 1.5 million tonnes per annum plate mill and a 0.6 million tonnes per annum pipe mill to add value to its products. Essar steel customized products catering to a variety of industry segments with one of the largest steel processing and distribution network located at many industrial hubs. Essar steel has been awarded with ISO: 9001:2000, ISO9002, ISO 1400, ISO27001, and OHSAS18001:1999 etc. Essar steel gives due importance to design and operation and has become a zero waste company. It has received recognition from reputed institutions like centre for science and environment, water digest, world steel association etc.
• **JSW Steel Ltd.**

JSW steel Ltd is one of the leading private sector steel producers in India. JSW group acquired Piramal steel Ltd which operated a mini steel mill at Tarapur in Maharashtra and set up Jindal iron and steel company with its first steel plant at Vasind near Mumbai and started manufacturing steel in 1982. Jindal vijaynagar steel was set up in 1994. In next two decades it expanded and Jindal iron and steel company merged with Jindal Vijaynagar steel Ltd. in 2005. Now JSW steel has plants in six locations in India, these locations are Vijaynagar in Karnataka, Salem in Tamil Nadu, and Tarapur, Vasind, Kalmeshwar and Dolvi in Maharashtra. Plants in Karnataka, Tamil Nadu and Maharashtra have a combined capacity of 14.3 million tonnes per annum, and it has an objective of expanding its capacity to 40 million tonnes in next decades. JSW steel has a plate and pipe mill in the US and the company has acquired mining assets in Chile, US and Mozambique. It has also formed joint venture for setting up a steel plant in Georgia and it has tied up with JFE steel corporation Japan for producing high grade Automotive steel. JSW is recognized worldwide for its high-end value added steel which is the result of The strong focus on innovation and R & D.

• **Bhushan Steel**

Bushan steel Ltd was founded by Brij Bushan Singal in the year 1987 with its first plant at Sahibabad in Uttar Pradesh. Bushan Steel Ltd formerly known as Bushan Steel & Strips Ltd is a well known leading and prominent player in the steel industry all over the world. With more than two decades of experience in steel manufacturing, it is now third largest secondary steel manufacturing company in India. Currently it has an annual production capacity of around 2 million tonnes. Bushan Steel Ltd has three manufacturing units – Sahibabad unit in Uttar Pradesh, Khopoli unit in Maharashtra, and Meramandali unit in Orissa. The company produces a range of products such as cold rolled closed annealed, galvanized coil and sheet, high tensile steel strapping, colour coated coils etc. BSL has emerged as the country’s only cold rolled steel plant with an independent line for producing cold rolled coil. BSL focuses on acquiring latest technology and know-how, and provides best quality of products to its customer.
• **Uttam Steel Ltd.**

Uttam Steel Ltd was founded by Mr Rajinder Miglani in the year 1985. Uttam Galva Steels Limited is among the largest producers of cold rolled steel (CR) and galvanized steel (GP) in Western India. The Company procure hot rolled steel (HR) and processes it into CR and further into GP and Colour Coated Coils. It specializes in making Galvanized coils ultra thin sheets, of as low as 0.13mm of thickness. In the fiscal 2012-13, it had net revenues of Rs.59111 million (US $ 1087 millions) and net income of Rs 616 million (US $ 11 millions). More than 50% of the Company's products are currently exported to 132 countries worldwide and it has a customer base in many advanced markets such as Australia, France, Germany, Greece, UK and the USA to name a few. The Company has established itself as a major supplier of CRCA to Manufacturers of automobiles, white goods, general engineering and drums & barrels segment in India. The Company is also a large supplier of galvanized coils and sheets to the construction industry. The Company plants are located at Khopoli, near Nhavasheva and Mumbai ports in Maharashtra. A close proximity to the ports provides the Company the advantage of lowering its transportation costs. The Company's domestic sales are also within the radius of 500 km from its manufacturing facilities to domestic companies. The Company has expanded and modernized its operations at Khopoli which have increased its cold rolling capacity to 1 million MT per annum as of March 2010. The Company has also increased its GP capacity to 750,000 MT per annum as of March 2010. The Company has also added a new colour coated line (Uttam Spectrum) with a capacity of 90,000 MT per annum as of March 2010. The Company has an entire range of cold rolling Reversible mills i.e. 20-Hi, 6-Hi, 4-Hi and newly commissioned twin stand 6-Hi mill. It is now in a position to process HR coils of different grades, thicknesses and widths and is able to meet virtually the entire thickness/width range of CR/GP/GC coils for various end-use sectors. A significant portion of the Company's CR coils and GP/GC, coils/sheets are in the higher value added thin gauge segment.
3.2.7 Structure of steel industry in India

3.2.7.1 Types of Steel

Usually Steel is a mixture of iron and carbon but it may also contain some other metallic or non-metallic elements such as manganese, silicon, nickel, lead, copper, chromium, etc.

On the basis of its composition, steel is divided into alloy steel and non-alloy steel. The steel which is produced using elements like manganese, silicon, nickel, chromium, etc., is called alloy steel while the steel without any alloying elements except carbon, which is normally present in it, is called non-alloy steel. Non-alloy steel can be mild steel which have up to 0.3 % of carbon content, medium steel with 0.3 % to 0.6 % of carbon content or high steel with more than 0.6 % of carbon content. All types of steel other than mild steel are called special steel. Steel with different composition has different properties In India, non-alloying steel constitutes about 95 percent of total finished steel production, and mild steel has large share in it.

On the basis of end use, steel is divided into structural steels, construction steel, deep drawing steel, forging quality, rail steel, etc.

On the basis of shape, size and form, steel is divided into different types such as liquid steel, ingots, semi-finished steel and finished steel. Liquid steel is the first product that comes out from furnace and then it is converted into ingots, and then ingots are converted to semis or semi-finished steel products. Crude steel generally include ingots and semis. Semis are further subject to forging and rolling for producing finish steel products such as flat steel products and long steel products.

a. Flat Steel

Flat steel are steel products in flat, plate, sheet or strip shapes. Flat Steel is mostly used in construction, shipbuilding, pipes and boiler applications.

- Cold Rolled Steel
- Galvanized Steel or GP/GC Sheets
- HR Coils
b. Long Steel

Long Steel are steel products in long, bar or rod shape like reinforced rods made of sponge iron. The steel long products are used in producing concrete, blocks, bars, tools, gears and engineering products.

3.2.7.2 Manufacturing process of steel

Following are the manufacturing process used in the production of steel (Indicus Analytics, 2009).

1. Blast furnace/basic oxygen furnace (BF/BOF)

Iron ore is converted into liquid form of Iron by BF but Iron produced by BF has high carbon content and other impurities, this iron is called pig iron. Because of its high carbon content, Pig iron has limited end user applications. To make steel products out of pig iron The Basic oxygen furnace is used for producing steel from the refined iron. Where its carbon content and other impurities are burnt or removed through slag separation. At present around 67% of the world steel is produced through BF/BOF route. This route is very good for volume production. Iron ore and coal/coke are used in BF as main inputs. BOF is also called oxygen furnace because oxygen is the only fuel used in the process. But the process requires high capital cost and substantial investments on infrastructure. Producers that use this technology include SAIL, RINL, TSL and JSWL.

2. Electric Arc Furnace (EAF)

Steel scrap or Pig iron or Sponge iron is used as the raw material in this process. Basic purpose of the EAF is re-melting sponge iron, steel scrap, and pig iron. At present around 31% of world steel is produced by this process. It uses electricity as much as 400-500 kWh/ton. EAF is an environment friendly process and has flexibility to produce variety of value added grades of steel. ISPAT, ESSAR, and the Jindal group are examples of producers, who use this technology.
3. **COREX or Cipcor Process**

COREX is an advanced process of producing steel. The process is used by a few only. Non-coking coal can directly be used in smelting work and lump ore and pellets are used as inputs in this process. With these two advantages steel producers can eliminate coking plants and sinter plants. Coking plant converts non-coking coal into more efficient fuel and sinter plant purify lump ore or pellets for further processing. Basic inputs to COREX are iron-ore and coal. Jindal Iron & Steel Company (JISCO) uses COREX technology to produce finished steel.

4. **Induction Arc Furnace (IAF)**

IAF is one of the most advance processes of steel making. IAF uses electricity as its main fuel. IAF is the most environment friendly steel making process and one of the most efficient ways of producing steel. But IAF requires clean products as its inputs as it lacks refining capacity. Large numbers of small steel companies use this technology. The high weight of the product significantly pushes up transport and movement costs. Therefore large integrated plants are the norm for cost efficient production. For specialized steel and alloys efficient production by smaller plants is possible.

### 3.2.7.3 Types of Steel Producers in India

There are mainly two types of steel producers in India (Corporate catalyst, 2015) as follows,

- Integrated producers, and
- Secondary producers

1. **Integrated steel producers**

Integrated steel producers have traditionally integrated steel units for which iron ore and coke are the main inputs. At present there are three main integrated producers of steel in India namely,

- Steel Authority of India Limited (SAIL),
• Tata Iron and Steel Co Ltd (TISCO) and
• Rashtriya Ispat Nigam Ltd (RINL).

SAIL dominates among the three integrated steel plants and this is because of its large steel production capacity plant size.

2. Secondary producers

Secondary producers use steel scrap or sponge iron or hot briquetted iron (HBI) as their inputs. Secondary producers mainly use Electric Arc Furnace (EAF) and Induction Furnace (IF) units. The followings are among the Secondary producers in India,

• Essar Steel Ltd.,
• Ispat Industries Ltd., and
• JSW Steel Ltd.

The integrated producers constitute most of the mild steel production in India. Their main products include flat steel products such as Hot Rolled, Cold Rolled and Galvanized steel. They also produce long and special steel in small quantities. On the other, secondary producers largely produce long steel products.

3.3 CHAPTER SUMMARY

The present chapter gives an overview of Indian Steel Industry. It also gives a brief history of steel and a brief overview of world steel industry. The chapter discusses how Indian steel industry has evolved with the passage of time and where it stands now in world steel industry. Furthermore, the chapter discusses about Crude steel production and consumption, import and export of Steel, demand and supply of steel, production process of steel, major players of steel in Indian steel Industry etc.
REFERENCES


Chapter 3

An Overview of Indian Steel Industry


