



## THE ROLE OF IRON AND STEEL INDUSTRY FOR ACHIEVING THE INDUSTRIAL DEVELOPMENT IN LIBYA

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### Abstract:

Developing countries are seeking to adopt industrial programs that emerge from comprehensive strategies for the industrial development. Iron and steel industry is considered the cornerstone of the integration of society, and the degree of progress of any country is measured by the production and consumption of iron and steel. This study aims to highlight the dimensions of industrial development and the advancement of the industrial sector in Libya. It has been achieved by analyzing the economic state in the field of iron and steel industry and its developmental effects on the economy of Libya.

The study concluded by noting the importance to the iron and steel industry in the Libyan economy in its ability to influence the other sectors and the expected profits; It also has an impact on the national output and achieves the effects on the sectors that are related to it. It is crucial for the need to diversify Libya from its economy to reduce dependence on oil and achieve sustainable industrial development.

### Introduction:

Industrialization is very important in the field of country development. It allows the fundamental transformations of the social and economic structure through the spread of advanced technical means. It also contributes to the integration of the economy by establishing interdependence and exchange between different sectors [1]. Therefore, developing countries seek to adopt industrial policies and programs that emerge from comprehensive strategies for industrial and economic development. Hence, the presence of an industrial sector capable of bringing products to market to compete with the products of developed countries. The iron and steel industry is considered the cornerstone of the integration of society. The importance of the iron and steel industry is due to its close association with several other industries, contributes to economic integration, and the industries that provide additional jobs; and the degree of progress of any country is measured by the

production and consumption of iron and steel [2]. It cannot be said that the iron and steel industry is limiting their role in regard to meet their own needs only, but it creates opportunities for workers in the related industries.

Libya is one of an undeveloped country which suffering from instability in politics and economy for a while, although it is a member of OPEC. The industrialization is very important in the development of the country, especially iron and steel sector; and there are several roles of the iron and steel industry for achieving the industrial development [3]. The role of such industry in the economy promotion of Algeria and India have been reviewed [3,4]. Also, environmental impacts of the steel industry in Libya has been studied, this is including the most important environmental parameters and their importance in order to mitigate negative environmental impacts [5]. However, this article is pointing to the



importance of the iron and steel sector in playing the role assigned to the development and stability of Libya. The article is divided into three sections. The first section is an overview of the iron and steel industry and its importance in the world, then it is presented the current position in Libya of achieving the advancement and development in the country. Finally, prospects and the different opportunities for the development of the iron and steel industry in Libya are mentioned.

## 2- The importance of the Iron and steel industry

The iron and steel industry is one of the most important strategic industries where it plays a major role in industrial and economic development. Statistical data at different time periods in many countries with different economic levels show a positive relationship between the consumption of steel products and the economic growth of the country [6]. The importance of the iron and steel industry as a sector has an influential role in development due to its close association with many other industries, for instance:

- The transportation field, this is including several trucks used to carry machines and equipment to factory's places, and truck and rail links used to carry raw materials and final products.
- Related industries for the steel industry such as mining industry, refractoriness (materials those are resistant to heat), and Ferroalloys.
- Consuming industries for iron and steel products, the most important ones are the manufacturing of cars, ships, household appliances, cans, equipment manufacturing, and many other engineering industries.
- The building construction field, this is one of the most important sector's consuming steel products in the form of longitudinal products. There is also a close link between the steel industry and facilities and service's projects such

as the water and sewage projects, which uses steel pipes in addition to the oil and gas sector, drilling, exploration, and transmission lines.

The iron and steel industry is one of the industries that provide new job opportunities, as its role is not limited to satisfying its needs, also provides employment opportunities in the industries that feed and consume its products. It is known that every job in the iron and steel industry provides, there are nine opportunities for employment in other industries, also each investment unit in the steel industry opens up double investment opportunities in the feed and consumer sectors of this industry [3].

The world produces more than 1.5 billion tons of iron per year, consumed in the form of various iron products (direct or indirect), and about 50 million workers are employed in jobs related to the iron industry or supporting industries. The most important of these supporting industries are: automotive, machinery and other industries that rely heavily on iron and steel products. The per-capita consumption of iron per annum has jumped from 150 kg in 2001 to 217 in 2012, in Libya, it was 145 and now 260 [7]. Such figures are indicating an increase in demand and consumption of iron and steel.

According to international statistics, the consumption of iron and steel by type of sector indicates that 46% of the world's steel production is occupied by the construction sector, followed by the machinery and heavy equipment industry, which accounts for 16% and the domestic appliance industry, which accounts for less than %3 [3]. These percentages are varied between countries; for instance, the motive of the iron industry in developing countries is the construction sector, while the industrial sector is the motive in industrialized countries.



In Libya, the percentage of steel occupied by state construction could reach to % 75 of the total quantity[7].

### 3 Global production and consumption

International statistics indicate that the production and consumption of iron during the period prior to the global financial crisis in 2008 was almost matching each other. The world markets did not suffer a surplus in supply. However, it is changed after the financial crisis, in the period between 2002 to 2006, the world markets were experiencing a slight surplus in demand. During the period, from 2008 to 2018, the market suffers from excess supply and decline in demand due to the decline in the economic growth rates of the major industrial countries as well as the decline of consumer confidence.

China remains the greatest country for consuming iron products since 1994 and at the same time, it is the world's greatest iron-producing country since 1996. It produces more than 800 million tons a year, half of what the world produces, and about 63 % of the rough trade on the sea went to China [8]. This confirms that the growth or slowdown of the Chinese economy is dragging the world to growth or recession. Regardless of the reasons for China's competitiveness and

the nature of the regulations and regulations in which the Chinese government supports the iron and steel industry to make it more competitive, iron and steel is the motive that has a clear impact upon the industry [9].

Iron ore is the most important input of the iron industry and has a global dynamic in its production, prices, supply quantities, quality, shipping issues, and costs. Iron ore prices have lost about 75% of their value in the middle of 2016 (about 40 USD) comparing with their value in 2011 (about 160 USD). These years had the minimum and maximum prices of iron ore in the last decade. However, its price shows stability in the last two years (about 80 USD). The price of this ore in the last ten years is shown in Figure 1 [10]. Iron ore production is controlled by a few international companies, which dominate 80% of the world's production. The mines and production operations are concentrated in Brazil and Australia [11]. The availability of this raw material at an appropriate price is a safety valve for iron producers seeking greater reliability and sustainability in iron production. As the mining and the steel and iron industries are as stand-alone industries, there are structural changes in the relationship between them.



Fig. 1 Price of Iron ore from 2008 to 2018



Figure 2 shows the geographical distribution of iron production and consumption in the world. The figure depicts that China has the largest population and the second-largest economy in the world, accounting for nearly half of the world's production and consumption in 2012, compared with 20% in the last ten years due to the large industrial and construction boom that has reached China during this short period of time [12].

The Organization for Economic Co-operation and Development (OECD)

expects China to continue to lead world steel consumption by 2020, further boosting the growth of the industrial and public works' sectors according to announced projects by 2020. Auto industry is also gaining strength as Chinese companies acquired international names such as Chrysler, Volvo, Jeep and others, which have gained good experience and achieved strong sales and expected to remain high until 2020[13].

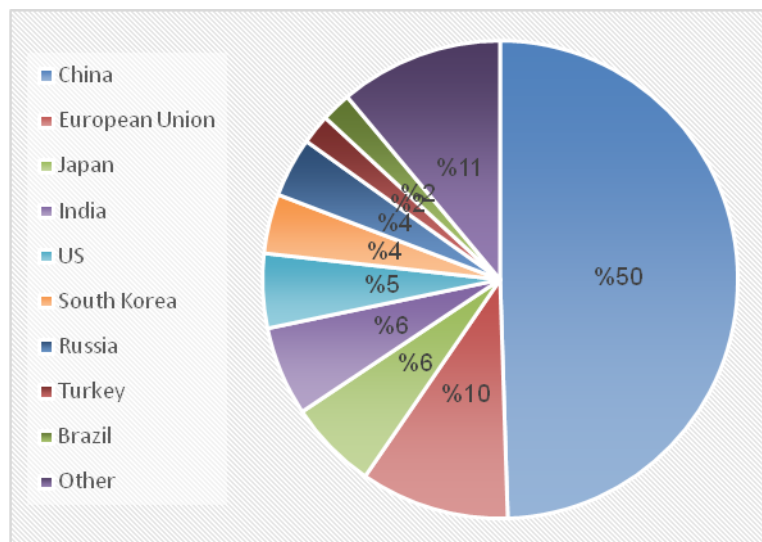


Fig. 2 Geographical distribution of iron production and consumption in the world

The major industrialized countries control the world market for being the most consumed and the greatest producer of iron as well as the leaders of the motion of the trade of exports and imports of iron products globally. The world markets are also linked with the state of consumer confidence in the economies of industrial countries, as well as financial decisions and economic policies of the major industrial countries. China is claimed as the largest Iron and Steel Exporter country in the world. It was reported that the iron and steel exports were more than of 43 million USD during the year 2016. This value represents 14.4% of

world exports of Iron and Steel (this includes bars, rods of alloy steel and stainless). Korea, Japan, Russian, and Germany are considered as the top iron and steel exporting countries as shown in Figure 3-a. Germany and united stated stood as the largest iron and steel exporting countries in the world. They are both exporting Steel and Iron to around 100 countries which represents 23 million USD during the year 2016. On the other hand, France, Belgium, Italy, and Austria are reported to be the largest Iron and Steel importing countries in the world[11]. The Figure 3-b shows the top 5 importing countries of Iron and Steel.

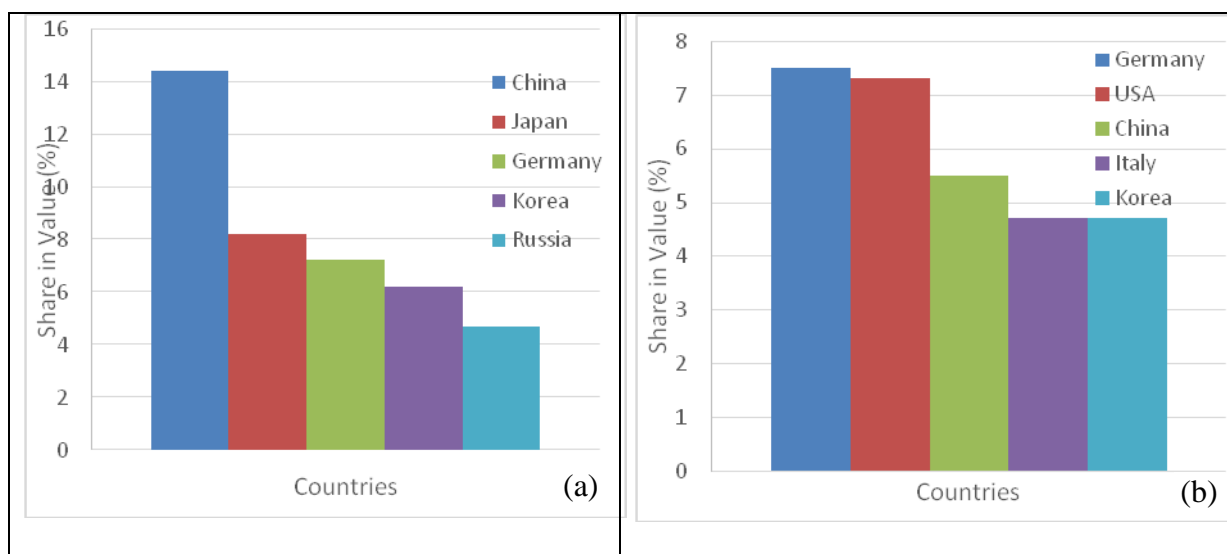


Fig. 3 The five largest iron and steel exporting and importing countries; a) export, b) import

#### 4- The iron and steel industry in Libya

After the independence of Libya, Libya did not own any firm specialized in the manufacture of iron and steel and even during the reign of the last king. The iron and steel industry in Libya was relatively modern. It has started with the establishment of a factory for rolling reinforcing bars in the city of Tripoli in the early seventies of the last century. The main factories of iron and steel in Libya are:

- **Scrap Melting Factory in Tripoli**

This plant was established in the mid-1970s for smelting and producing the billet and veins. It was opened in 1976 with a production capacity of 21000 tons per year of steel. In 1980, the rolling mill was opened with a production capacity of 20000 tons per year [14].

- **The iron and steel industry complex in Misurata**

Libyan steel & Iron Company started commercial operation in late 1989. It is located in Misurata (200km west Tripoli). The main activities of this company are steel productions such as flat and non-flat products, steel conversion, industrial gas, local marketing, engineering studies, construction units, labor training, export and

import. The development of this company has been linked with the national economic planning through the various economic policies that Libya has undergone. The current capacity of this factory is 1.2 million tons per a year [14].

- **Private Scrap Smelting Factory**

The private sector of iron and steel sector in Libya is started in operating last 15years, there are several private factories for scrap smelting located in different cities in Libya such as Tripoli, Benghazi, Misurata and Zliten. Such factories could produce between 500 tons to 10000 tons per years.

#### 5- The impact of iron and steel industry on the national economy

It is known that oil products continue to dominate Libya economic activity, with an added value of the 38Billion dollars. However, this sector is facing huge issues after 2011, which has the negative effect on the total income of the country. Therefore, it is important for the country to support other sectors. One of the most important sectors after oil sector is the manufacturing and industrial sector. Libyan's manufacturing industries are suffering a difficult situation, but for the iron and steel sector,



it has managed to achieve the exception by achieving significant results for the majority of the period to five years.

The iron and steel complex in Misurata is the dominant center for the production of iron in the Libyan state. The figure 4 shows the production of steel from this factory which includes rebar, plate, steel construction in the last twenty years. This figure depicts the growth of steel production in the country since 1998 until now. Although, there was a high drop in

production of steel in 2011 due to the revolution and conflicts in the country, but the line of production grows up again after this year with less rate.

In 2007 and 2009, it was seen an improvement in the performance of the industrial sector. This is the highest industrial growth recorded in Libya since 1998. This improvement is due to the rise in world oil prices in 2008, which was a driving force for the higher value added of the extractive industry sector.

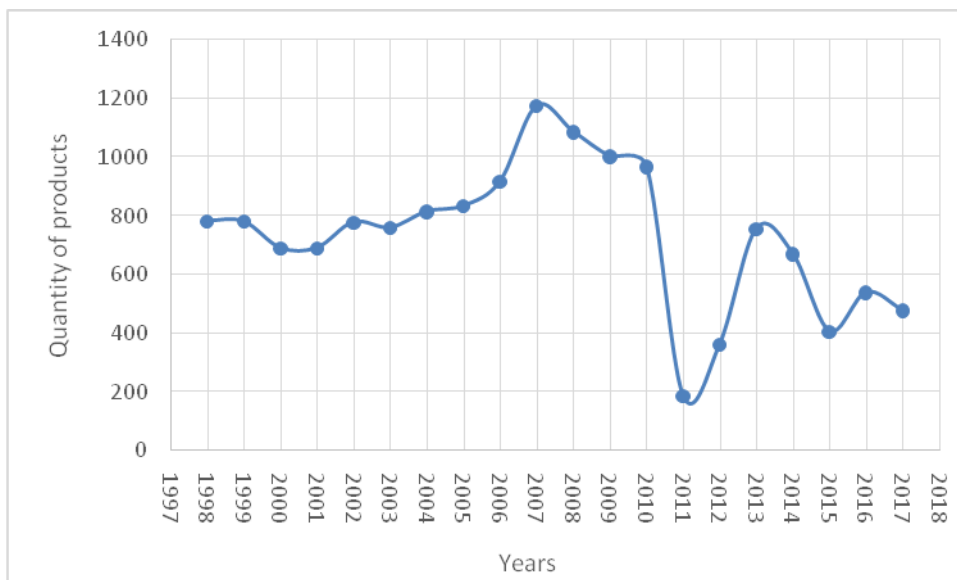


Fig. 4 Production quantity from 1998 to 2017

The per-capita consumption of iron per annum is presented in Figure 5, it has increased from 145 kg in 2006 to 260kg in 2014 [7]. These figures are indicating that an increase in demand and consumption of iron and steel. It shows a continuous increase in the gross output of the iron and

steel industry over the next years. Here, it could be deduced the developmental effects of this sector on the national economy by the development of the production. This would contribute in the growing of the national economy and it would also supply the local market.

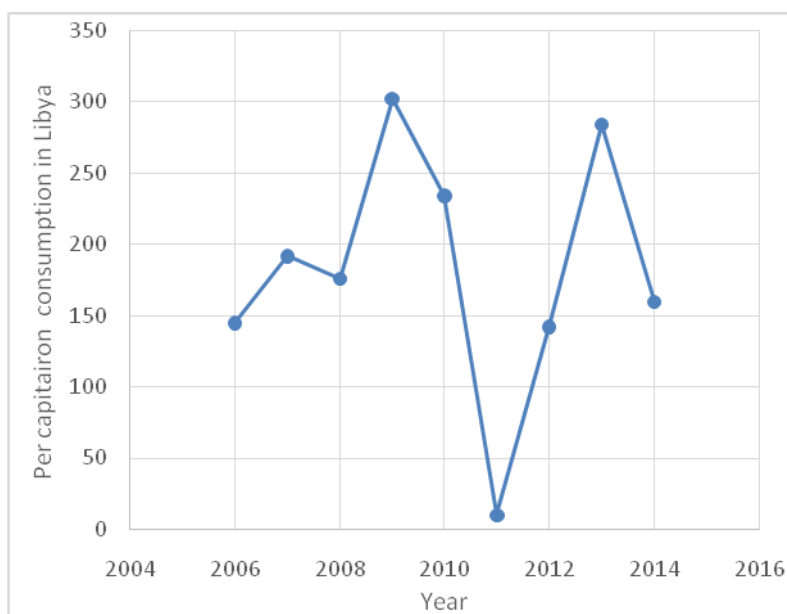


Fig. 5 The per capita consumption of iron per year in Libya [5]

For importing in this sector, Libya imports of raw materials for the iron and steel sector are estimated 500000 tons per annum of iron ore; which are usually from Brazil. The Libyan market remains in need of Million tons to cover the needs of this material. It the same for the final products, although the existence government complex and several private the company, the 50% of the product

still import from the outside during the last years. Figure 6 shows that there are around a 500000 tons of rebar steel has been imported by the private sector via the government ports, and this number has been decreased due to the decreasing the Libyan currency comparing with the foreign currencies in last two years.

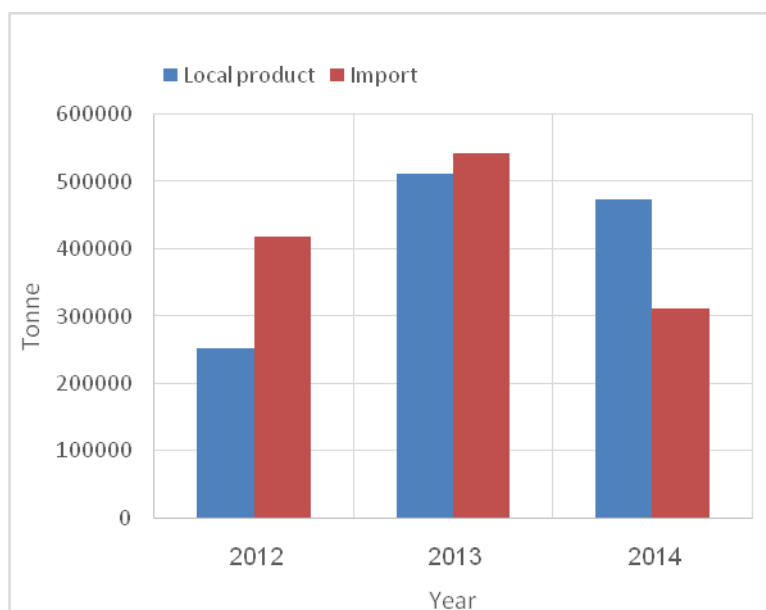


Fig. 6 Comparing between local product and import of rebar steel



## **6- Prospects for development of the iron and steel industry in Libya**

Despite the importance of the iron and steel industry in achieving the requirements of economic development and its fundamental role in Libyan economy, this sector has not yet played the enough role as a leading sector for economic development. There are several opportunities, and strategies could be exploited in the country to rehabilitate and improve this sector. The most important future projects and opportunities for development of the iron and steel sector are:

### **Steel Plant Development Phase 1**

There are several development plans in iron and steel complex those had been suspended in last ten years, executing of those plans could increase the productivity of this plant to reach 1.5 million tons per annum of the veins and blocks as well as partial development of steel plants no. 4 to double the production of liquid steel annually, and develop the new hot rolling mill to produce nearly million tons of hot rolls annually.

### **Investment the by-products of the Libyan iron and steel company**

The Libyan Iron and Steel company production of by-products is estimated about 8% of its total final products. This is including: slag, iron ore powder, lime, scrap and others. These by-products are come from different plants in the complex, especially the steel plant, reduction and rolling mills. Slag is the highest by-product of the factory is estimated 40% of the total by-products of the company, followed by iron ore powder, which is more than 25% of the total.

Due to the rise of iron ore price and other materials, several projects could be established to exploit these productions

### **Conclusion:**

A review of the various findings of this article shows the ability of the iron and steel sector to generating economic development, and its ability to push the national economy towards progress. However, this sector has

which lead to reduction in costs or increasing in the profit, for example, requesting iron ore powder, also recycling the slag, smelting the scrap and others.

The most important end uses of most by-products are building materials, fillers for concrete and asphalt mixtures used for road paving, and can be recycled as raw materials for the production of iron in blast furnaces and direct reduction shafts. Beside reducing the costs, environmental benefits are also important in exploiting these products.

### **Supporting Private Scrap Smelting Factory**

As it is mentioned before that there are several private factories for scrap smelting in different cities, however, scrapes are considering as local sources, so it is prevented to be exported. This leads to opportunities for building scrap smelting factory or supporting the existence once.

### **Investment to exploit one of the largest iron mines in the area.**

This is through the exploitation of the Wadi Asshati mine. It is one of the largest iron mines in the area, which is located in south of the country. The exploitation of this mine will result in developing the region, create new jobs and reduce iron ore imports. The previous studies about this mine show that there are more than the 1000m ton of iron ores that can be produced.

Although this ore is contained with the Phosphor and needs special type of furnaces such as the ladle furnace for melting processes, and such furnace is not available in Libya now, it could be invested by building a new factory with this technique or exporting it to other countries to rise the income of the government.

not received a large share of investments through the various development programs of the national economy despite the importance of this sector.

This sector could play a key role in the economy because enter its products in



different branches of other industries. Therefore, it is necessary to establish integrated iron and steel plants to promote the national economy.

The Government of Libya shall study the various positive effects in cooperation with experts and specialists in the affairs of the iron and steel sector in order to develop a strategy for this sector to make maximum use of this sector. The need to open the way for foreign investments to develop the iron and steel sector and this through entering into a partnership with international companies in order to exploit the best capabilities of the state in this area of mines that are rich in large unused resources such as located in the area of Barak Shati and other areas.

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