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## Study on Sustainable Development of Iron and Steel Industry—Taking HBIS Group as an Example

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# Study on Sustainable Development of Iron and Steel Industry——Taking HBIS Group as an Example

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**Abstract.** Iron and steel industry is the basic industry of the national economy, playing an important role in China's economic development. However, with the rapid development of iron and steel industry, the problems increasingly exposed. Taking HBIS as an example, firstly on the basis of existing theory, gathering 2008-2015 HBIS product data as the basic data, this thesis has some study results showing that in recent years, the iron and steel industry developed rapidly, but there are also problems, such as irrational product structure, frequent trade friction, lacking of iron ore pricing power, severe overcapacity and serious haze. Finally, this paper proposes innovative suggestions for HBIS aimed at the problems, such as the continuous technological innovation, regional merger and acquisitions. These initiatives may promote the development of China's steel industry.

## 1. Introduction

The iron and steel industry is the basic industry of the national economy, and its total output value accounts for about 15% of the GDP. It plays an important role in China's economic development. In recent years, China's steel industry has developed rapidly, steel trade has achieved remarkable results, and the steel industry system has been gradually improved. However, there are various problems in the process of development. Anti-dumping investigations and frequent trade frictions, frequent encounters of haze weather and other problems plague the development of the steel industry. This paper attempts to study the reasons for these problems and the solutions to keep the steel industry sustainable develop. This paper attempts to study with the example of HBIS Group, the world's second largest steel company, and hopes to learn from the development of China's steel industry.

## 2. Journal Review

The development of the steel industry in recent years has had an important impact on China's economic growth, and scholars at home and abroad have conducted in-depth research. They used a variety of analytical methods to select different regions and countries to analyze the status of export trade of steel companies.

### 2.1 Research on the overcapacity

Huang Wen (2013) proposed that steel enterprises should eliminate backward coke ovens for overcapacity, and invest in installing more coke oven dry quenching equipment, and the dry quenching



rate will further increase. Wang Yifang (2013) used the capacity utilization rate to judge the steel production capacity, and believed that the accumulation of excessive investment and expansion imbalance is the direct cause of overcapacity. Wang Tianfeng (2011) used the quantitative model of stock assets to analyze the causes of overcapacity in China. Due to the lack of overall planning in the steel market, the structure of stock assets was unbalanced, resulting in overcapacity.

### *2.2 The study of transformation and upgrading of iron and steel enterprises*

Yang Weihong (2015) believes that HBIS will improve from the following aspects: first, in technology research and development; second, on the manufacturing platform, combined with the Internet; third, service to manufacturing Transform and build a steel service platform. Ma Wei (2012) believes that the transformation and upgrading of the steel industry needs the support of national policies, and enterprises must continue to cultivate specialty products, eliminate outdated equipment, and save energy and reduce emissions. Wang Yifang (2010) proposed that in order to achieve sustainable development of enterprises, technological innovation must be carried out to reflect the company's own competitive advantages.

### *2.3 Research on environmental and economic development*

Suisse (2012) proposed from the perspective of environmental pollution from the development of steel enterprises. If enterprises want to reduce pollution emissions and promote energy conservation and emission reduction, they must eliminate outdated equipment and optimize the layout. Zhu Qirong (2010) proposed that achieving cleaner production and emissions is an inevitable choice for enterprises to achieve sustainable development. Enterprises must improve energy efficiency and reduce carbon emissions to achieve a green economy.

### *2.4 The study of iron ore pricing*

Yan Yan (2013) pointed out that in terms of iron ore pricing power, China has repeatedly hit the wall in iron ore pricing negotiations because it lacks a strong negotiating group and has been in a passive position. Kang Jiannan (2012) believes that in the absence of iron ore resources, companies need to ensure low-cost resource supply and create a competitive advantage.

### *2.5 Research on export trade friction*

The export trade friction, anti-dumping cases against China have shown an increasing trend. Liu Qianqian (2011) found that the number of countries investigating anti-dumping investigations in China has been increasing, and the number of anti-dumping investigations is increasing year by year.

Throughout the study of domestic and foreign scholars, they have obtained certain research results in steel enterprise transformation and upgrading, trade friction, iron ore pricing, overcapacity, most of which are aimed at steel export trade research in China and Hebei Province. This paper studies the status of export trade of HBIS Group at the enterprise level. Through the analysis, it analyzes how a group can survive and develop under the influence of international environment and domestic environment.

## **3. Data Sources and Analysis**

The current situation description and problem analysis of HBIS Group's problems are all from analysis of relevant steel data of HBIS Group. In 2008-2015, the sales volume of HBIS Group's products showed a trend of decreasing first and then increasing. In 2008, the export of steel products was 2.82 million tons. In 2009, it fell to 267,900 tons. From 2010 to 2015, steel sales showed a steady growth trend. In 2015, HBIS's innovative steel products Sales exceeded 10 million tons.

### *3.1 Steel structure*

Most of the steel products from HBIS are low-end products, because low prices will smash the rice bowls of foreign steel companies, making foreign steel companies thorns in the back. It can be seen

from Table 1 that the medium and heavy plate belt accounts for a relatively large proportion of the total export volume, but due to its high energy consumption and low added value, it has a shrinking trend in the past two years; the pipe is the main export product of HBIS, and it is exported. The proportion of the volume is maintained at around 20%. Due to the high added value of coated strips, the export volume has increased in recent years, and its export volume ratio is close to 20% in 2014. The export volume of cold-plated strips has been relatively stable; wire rods as an important export product have been declining year by year due to the shrinking of foreign markets.

From 2011 to 2015, HBIS Group won 364 national patents, 32 science and technology awards, and 227 high-tech talents. HBIS Group successfully held the Swiss company Deco in 2014 and introduced key technologies and management experience. HBIS Group owns large-scale steel main equipment and has reached the world's leading level. The average volume of blast furnace is 1951m<sup>3</sup>, the average volume of sintering machine is 189m<sup>2</sup>, and the average capacity of converter is 108 tons. HBIS Group has the largest production capacity in the production of sheet metal.

Table 1. The proportion of products of HBIS

Year	Medium plate	Pipe	Coated strip	Cold plate
2011	24	21	10	9
2012	29	19	12	5
2013	25	25	15	8
2014	15	25	18	6
Year	Profile	Wire	Bar	Other
2011	9	12	9	6
2012	6	9	11	9
2013	5	5	5	12
2014	12	8	4	12

### 3.2 Carbon emissions from steel products

Hebei Province is an important steel production and export base in China, and its steel export output ranks first in the country for many years. Iron and steel enterprises export a large amount of steel products, leaving pollution in the country, bringing a series of environmental problems. The haze weather has become the most urgent problem to be solved in the province's environmental pollution, and it is more related to the sustainable development of the entire Hebei economy. It can be seen from Table 4 that the carbon emissions show a trend of increasing year by year. From 2008 to 2009, due to the global economic crisis, steel products decreased, and carbon emissions remained below 70 million tons. Carbon emissions have been increasing from 2010 to 2014. In 2015, the export of steel products achieved "high innovation" and the carbon emissions exceeded 100 million tons. According to the Shijiazhuang City Statistics Bureau's 2008-2015 steel export carbon emissions accounted for the proportion of carbon emissions in Hebei Province (see Table 2), the proportion is increasing. More insiders pointed out that the carbon emissions of the HBIS Group accounted for about 60% of the total carbon emissions of steel products in Hebei Province.

Table 2. Carbon emissions from steel products

Year	2008	2009	2010	2011
Carbon Emission	5863.88	6977.66	7735.15	7817.76

<b>Year</b>	2012	2013	2014	2015
<b>Carbon Emission</b>	8466.06	8812.55	9910.95	10424.23

### 3.3 Status of raw materials

The production of low-end products brings serious pollution to the environment and also causes huge waste of resources. This must properly eliminate outdated equipment and concentrate on research and development to produce high value-added products. It can be seen from Table 3 that Hebei Province accounts for more than half of the cities with the worst air quality. It is reported that the Ministry of Environmental Protection of Hebei Province has clearly proposed that the production capacity of steel will be transferred to overseas by 5 million tons by 2017, and by 2023, efforts will be made to transfer 20 million tons of steel production capacity to Hebei Province.

Table 3. 2015 National air quality's worst cities

<b>Rank</b>	1	2	3	4	5
<b>City</b>	Tang shan	Shijia zhuang	Zheng zhou	Xing tai	Heng shui
<b>Rank</b>	6	7	8	9	10
<b>City</b>	Han dan	Bao ding	Xi ning	Lang fang	Bei jing

### 3.4 Status of raw materials attached

The HBIS Group's iron ore mine reached 7.4 billion tons. In 2010, HBIS Group added about 1 billion tons of iron ore in Macheng and about 100 million tons of iron ore in Qinglongshan. In August 2013, HBIS acquired 270 million tons of iron ore and 200 million tons of copper resources from South Africa's PMC Mining Company.

The international iron ore market is dominated by BHP Billiton, Vale and Rio Tinto. The three major mines monopolize the global supply of iron ore by about 70%, thus forming a pricing power in terms of pricing. Australia is the most important source of iron ore imports. The proportion of imported iron ore in India has remained at around 16%. The proportion of imported iron ore in Brazil has remained above 20%.

Table 4. The proportion of iron ore import source countries

<b>Country</b>	Australia	Brazil	India	South Africa	Other
<b>Import ratio</b>	41.50	23.70	16.40	12.80	5.60

### 3.5 Status of anti-dumping cases

The number of anti-dumping cases encountered in China has been increasing year by year. The proportion of anti-dumping investigations in China has increased in the proportion of the total number of cases in the world. In 2015, the proportion of Chinese cases accounted for 29.84% of the total number of cases in the world. The number of anti-dumping investigations against the steel industry is also increasing year by year. In 2015, the number of steel industry cases accounted for more than 50%

of the total number of anti-dumping investigations in China. In the number of cases in the steel industry in 2015, there were 8 cases concerning the HBIS Group. (See Table 5)

Table 5. The proportion of iron ore import source countries

Year	Steel industry cases in China	Number of cases in China	Number of cases in the world
2005	8	20	157
2006	15	43	225
2007	14	33	243
2008	10	28	256
2009	13	40	354
2010	17	43	292
2011	21	53	364
2012	19	51	312
2013	20	42	232
2014	23	49	212
2015	29	57	191

#### 4. Conclusion

From homogenous product price wars to product differentiation. China's high-end products, such as electrical steel and shipbuilding boards, have a downward trend in gross profit under the pressure of homogenous product price wars. They must break through the gaps and seize market demand. Promoting scientific and technological innovation and improving the quality of production factors is an extremely important part. Strengthen cooperation between enterprises and scientific research institutions and universities, independently innovate and enhance the core competitiveness of steel products, and develop high value-added steel products. Steel enterprises should focus on producing high-end brand products. Promote the structural adjustment of the steel industry by means of mergers and acquisitions, start from the internal organizational structure transformation, promote the structural adjustment of the steel industry and increase the restructuring of enterprises, and improve the concentration and structure of the steel industry. The government should give certain guidance and support to the enterprise, enhance regional industry concentration, shape the complete industrial chain, integrate upstream and downstream, and optimize resource allocation. Innovate in management. The enterprises that have exceeded the national standards for pollutant emission indicators will take certain punishment measures. The use of scrap steel resources, increase the recovery rate of iron-containing materials, promote the application of energy-saving technologies, which is conducive to reducing energy consumption, reducing environmental pressure, and achieving sustainable development strategies. China has a large amount of low-grade, ultra-low-grade iron ore. Rational development and utilization of low-grade ore is an effective way to increase the supply of domestic iron ore. Encourage and support steel companies to explore resources abroad, reduce the impact of rising iron ore prices, and effectively avoid trade frictions.

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