

# The Research on the Effect of Reducing Excessive Industrial Capacity of State-owned Iron and Steel Enterprises in Yunnan Province

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**Abstract:** The low industrial concentration and production overcapacity is always the problem in the development of iron and steel industry in Yunnan Province. Especially in the state-owned iron and steel enterprises, it reveals as a periodical and institutional excess. After four years, the state-owned iron and steel enterprises in Yunnan Province will gradually complete the task of removing excess low-end production capacity, and turn losses into profits. This outcome is gained by setting up a co-development framework for the iron and steel industry and non-steel industry. This paper studies on the actual operation data of state-owned iron and steel enterprises in Yunnan Province; sorts out the implementation effect of various production overcapacity reducing measures. By analysing all these data and measures, hopefully it will provide some references for the enterprises with production overcapacity problems to adjust and improve the measures in the future.

## 1. Introduction

Excess manufacturing capacity is an inevitable economic phenomenon in an economic cycle for a country. Capacity utilization rate is the most direct and commonly used indicator to judge whether there is serious overcapacity [1]. The capacity utilization ratio of the industry is quite different. It is not only related to the industrial organization structure, but also related to the advanced productivity, the competitive mode and the level of industrial development [2]. The capacity utilization rate can be divided into eight different ranges: 0-30% is extreme excess, 30% - 60% is serious excess, 60% - 75% is significant excess, 75% - 80% is slight excess, 80% - 85% is basic moderate, 85% - 90% is significant shortage, 90% - 95% is serious shortage, and more than 95% is capacity bottleneck [3]. The overcapacity in China is affected by cyclical and aperiodic factors. And aperiodic overcapacity includes structural overcapacity and institutional overcapacity [4]. Among all aperiodic factors, the allocation of credit resources is one of the key factors to bring out the excessive capacity of production in China. In terms of financial support for industry development, due to the differentiated treatment of banking system, capacity expansion will be induced in the economic upward period, and capacity withdrawal will be delayed in the economic downward period [5]. In addition, governments rely on the investment to promote economic growth, excessive intervention in the market and economic operation will inevitably lead to institutional excess production capacity. In China, light industry is characterized by "structural overcapacity", heavy industry is characterized by "system overcapacity", and some emerging industries are characterized both by "structural and system overcapacity"[6].

## 2. Capacity Reducing Measures of State-owned Iron and Steel Enterprises in Yunnan Province

Since 2016, the supply side structural restructuring has been implemented all over the China. Yunnan state-owned iron and steel enterprises, mainly Kunming Iron and Steel Group Co., Ltd. (short for KISG), actively acted on the call of the state to reduce production capacity by shutting down the production lines of excess products and upgrading the existing industries. Namely, the corporation shut down seven blast furnaces (the total volume of 6420 cubic meters), five converters

(three of them, 32 tons each; two of them, 50 tons each ), six steel converters, as well as all related equipment and facilities for sintering and rolling, which leads to the 2.8 million tons reduction of crude steel. In August 2019, in order to reduce more ineffective production capacity, the KISG corporation transferred 3 blast furnaces (3.12 million tons production capacity), and 2 converters (1.52 million tons production capacity) to a metallurgical company in Guangxi.

During 2017-2019, the non-steel business of KISG gradually surpassed the main business of steel, started to build the “KISG mode” in transformation and upgrading. Under this mode, it requires rebuild the effective production capacity and optimize it by getting rid of the heavy polluting Coking production and relocating the production area. By building Kunming Baoxiang airport international logistics base, Anning Caopu green intelligent manufacturing base, KISG industrial heritage cultural tourism program and senior citizen health maintenance base to help the non-steel industry development. Promote the intensive production and coordinate the development of existing non-steel industry with the support of local government policies.

### 3. Production Capacity Reduction Efficiency of Yunnan State-Owned Iron and Steel Enterprises

#### 3.1 Operation Status of State-owned Iron and Steel Enterprises in Yunnan

After four years efforts, Yunnan state-owned iron and steel enterprises, i.e. the KISG corporation started to turn loss into profit. In table1, the total revenue has been increasing gradually, from approximately 80.8 billion yuan in 2016 up to 120 billion yuan in 2019. The total profit raise from-0.5 billion yuan in 2016 to 1.4 billion yuan in 2019.

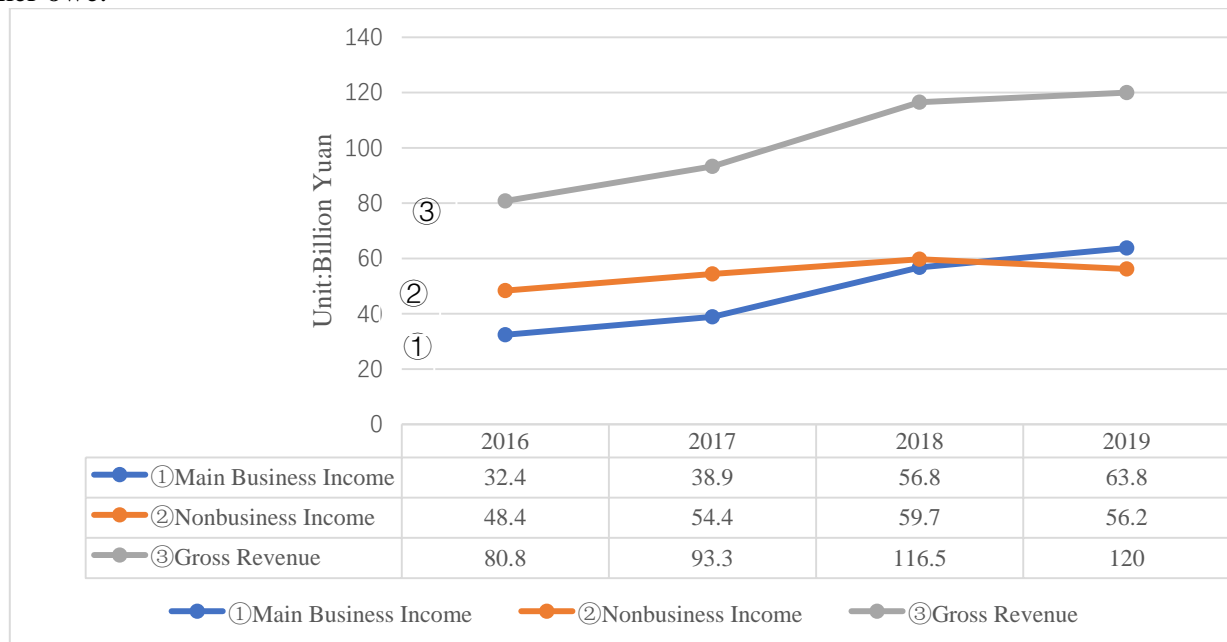
Table1 2016-2019 business data of Yunnan state-owned iron and steel enterprises (KISG).

year		Unit: Billion yuan			
Item		2016	2017	2018	2019
1.Revenue	Gross revenue	80.8	93.3	116.5	120.0
	Iron & Steel industry	32.4	38.9	56.8	63.8
	Non- Iron & Steel industry	48.4	54.4	59.7	56.2
2.Profit	Total profit	-0.5	1.0	1.2	1.4

Resource: sorted from KISG audit report from 2016-2019, Shanghai clearing house website.

In 2017, the gross revenue of the KISG corporation was about 93.3 billion yuan, the revenue of non-Iron& Steel industry was 54.4 billion yuan exceeded the Iron& steel industry which is 38.9 billion yuan for the first time in recent three years. The conduction of the measurements on reducing production capacity, not only brings more suitable steel products supply to the market; but the rapid growth of local real estate and infrastructure programs, also brings more demand for steel products. The operating revenue of KISG corporation exceeded 100 billion yuan in 2018. And the non-steel industry revenue was about 59.7 billion yuan. The KISG has gradually become an integrated modern enterprise group, with traditional iron& steel industry and non-iron& steel emerging industry. Due to the Environmental protection and production restriction policy started from 2016, production cost of all heavy industry, including KISG corporation, was higher year by year. According to the new environment law, which put into effect in 2015, indicates that measures shall be taken to limit production and stop production in case that the polluter exceeds the standard and the total amount. Iron and steel production have a long process and many pollution productions links. In 2018, the total emissions of sulfur dioxide, nitrogen oxide and particulate matter in Chinese iron and steel industry were 1.06 million tons, 1.72 million tons and 2.81 million tons respectively, accounting for about 7%, 10% and 20% of the total emissions of major pollutants in China, so in foreseeable future more restrict regulation will be issued and reinforced. In Fig 1, the main business income (iron & steel production) of KISG corporation was 63.8 billion yuan, the growth rate is 12%, less than last year, which is 46%. Because more resources are used to complete the environmental upgrading in iron and steel production process. New less polluted production line has been building in KISG's new manufacture base in Caopu, Anning.

In that area, new manufacture facilities will be built. In terms of pelletizing and sintering, a new sintering machine of 450 square meters (designed capacity 4 million tons) will be built; relocation and reform of two pelletizing production lines into Grate kiln pellet production lines, each line produce 1.3 million tons per year. With respect to iron and steel produce, a new 2500 m3 blast furnace will be built, designed iron production capacity is 2.13 million tons. Along with two 120-ton converters and two 120-ton LF furnaces will be built, designed crude steel capacity is 2.8 million tons. In 2019, the non-iron & steel industry suffered some losses (in Fig1), which mostly affected by some industrial structure adjustment measures, such as the combination between Yunnan logistic group and KISG subsidiary, Baoxiang logistics, the later would repay the debts the former owe.



Resource: sorted from table 1.

Figure 1 2016-2019 Yunnan state-owned Iron & steel enterprise business volume trend.

### 3.2 Main Iron and Steel Products Output

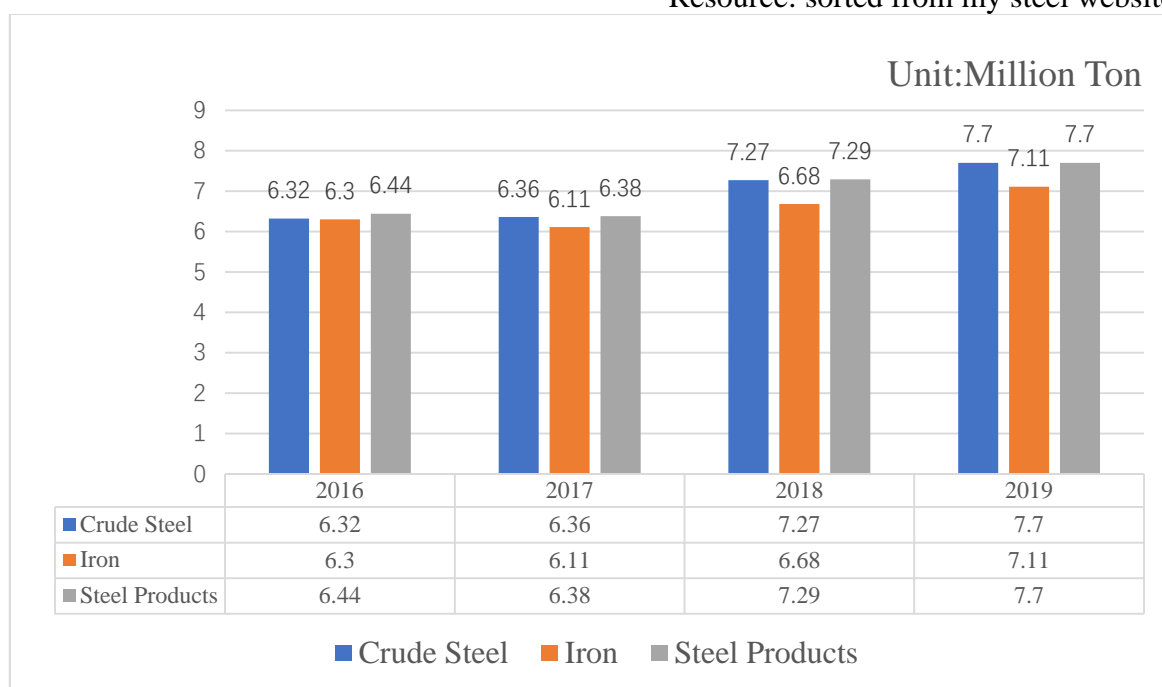
In the past four years, the production of iron was slowly increase from 6.3MT in 2016 to 7.11MT in 2019. In table2, the price was increased from 1900yuan in 2016 to 2900yuan in 2019, which is more than 1.5 times compare to the price four years before. The higher iron price the more expensive steel products, with respect of the quantity and price of crude steel and finished steel, both of their quantities and price increased in 2017 and declined in 2018. Yunnan real-estate market reblooming in 2017, along with more new real estate programs, the structural steel, such as Grade III anti-seismic screw steel, was most popular at that moment. But most of the steel products were produced and purchased in Kunming, about 70% of the market share. Although the demand side is an active factor to raise the sales and steel products price, the strict environmental regulation, the pressure of manufacture base relocation and industrial upgrade still seriously influence the steel products' cost.

Table 2 Annual products output change from 2016 to 2019

Year	Iron		Crude steel		Finished Steel	
	Q (MT)	P(yuan/T)	Q (MT)	P(yuan/T)	Q (MT)	P(yuan/T)
2016	6.3	1900	6.32	3070	6.44	4090
2017	6.11	2600	6.36	3350	6.38	5020
2018	6.68	2880	7.27	3050	7.29	4650
2019	7.11	2900	7.70	3100	7.70	4520

Note: "Q" stands for Quantity, "P" stands for Price, and "MT" stands for Million Ton.

Resource: sorted from my steel website.



Resource: Sorted from table2.

Figure 2 Iron & Steel Products output from 2016 to 2019.

### 3.3 Outcomes of Emerging Industry Production

Whilst eliminating excess capacity, the corporation focused on building new projects and emerging industries to accelerate industrial transformation. The KISG corporation take the titanium industry as the core, for developing new material industry. It accelerated the project of "R & D and application of manufacturing technology for low cost and high corrosion resistant titanium and titanium alloy pipes and high-quality titanium strips ", and strive to build two industrial parks, i.e. Chuxiong China Green New Titanium Valley and Panzhihua vanadium titanium new material park.

In 2016, the large-scale electron beam cooling bed smelting furnace development project, sponsored by the KISG and Panzhihua Municipal Government, started to build. The project is developed, designed and manufactured by Yunnan Titanium Industry Co., Ltd., a subsidiary of the KISG corporation, which has independent intellectual property rights. Electron beam cooling bed furnace has been successfully completed and put into operation. In 2019, Titanium slab and coiling belt were produced, which produced titanium ingot about 4720 tons, sold 4300 tons. Yunnan high performance titanium alloy engineering research center was approved. The first two month in 2020, there was titanium ingot output about 459 tons and realized more than 46 million yuan.

At the same year, the Yunnan Tianlang energy conservation and environmental protection group was established by integrates 6 companies including Yunnan Dahongshan pipeline company, Yunnan KISG water purification technology company and Pan Asia energy technology company. It has formed an energy conservation and environmental protection industry group, total six fields, including fluid pipeline transportation, solid and hazardous waste disposal, Water treatment, environmental monitoring, industrial energy saving, intelligent control. In 2016, it realized operating revenue 582 million yuan and profit 228 million yuan. The pipeline transportation of Tianlang environmental protection group is stable, and the water treatment business has made a breakthrough, realized profit about 0.4 billion yuan. By the end of 2020, it will achieve an operating revenue 4.5 billion yuan and a profit 900 million yuan.

Under the opportunity of Yunnan Province to list modern logistics industry as the eight emerging industries of Yunnan Province, the corporation started to treat the logistics industry as a new pillar industry, based on the former industrial foundation, layout more logistics knots. In 2017, the construction of phase I, the Kunming Baoxiang cold chain port project started. And in 2019, the sales revenues were about 11.13 billion yuan.

As for the headquarter of KISG corporation, there is about 6.36 km<sup>2</sup> spare land after all the facilities moved to the Caopu new manufactory base. According to the requirement of Anning local government for building a garden city, these areas will be divided into different parts to fulfill different needs, such as a modern business center, high-end advanced equipment manufacturing, big data industry and Incubation Park, industrial heritage cultural park and characteristic catering tourism center etc.

In 2019, the cement production was about 20 MT. The health and tourism industries earned a total revenue 3.87 billion yuan and a profit 55.36 million yuan. Asset management companies have made new progress in management assets, with a total annual revenue of 860 million yuan. Kunming Electric Science Research Institute makes every effort to do well in product manufacturing, engineering services, test operation and maintenance services, actively develops external markets, and expects to achieve an annual operating revenue of 62.86 million yuan.

#### **4. Suggestions for Ensuring the Implementation of the Measures for Reducing the Production Capacity**

There are many policies and countermeasures to dealing with the production overcapacity in iron and steel industry. After three years reforms and upgrade, Yunnan state-owned iron and steel enterprise has been making its efforts to get away with the heavy burden and loss from of production overcapacity. However, there is still a long way to go, for instance, the unfinished new manufacture base, the newly established logistics group, the uncertain market demand and relatively excessive supply. Even in upgraded products line somehow exist overcapacity (titanium steel).

So firstly, the person in charge of the corporation should pay closely attention to the national macroeconomic data, financial policies, monetary policies etc. Serve for the process of iron and steel industry development strategies making and business operating. Timely adjust the output, avoid excess production. Find suitable methods to integrate the iron and steel industry and newly emerging industry.

Secondly, use digital technologies, such as the Internet of Things, big data, artificial intelligence, etc., to assist iron and steel enterprises to collect, monitor and analyze the energy consumption and pollution discharge in each production link in the industry. In order to achieve long-term sustainable and healthy development and establish an eco-friendly industry, the enterprise should optimize and upgrade the production equipment by adopting all kinds of resources.

Thirdly, the enterprise should extend the depth of processing iron and steel products, and the application scope. In particular, the enterprise should extend the iron and steel industry chain, promote downstream products such as anti-seismic residential, elevator, three-dimensional garage steel. At the same time, develop new products, such as high-strength, toughness and low-density steel for automobile, ship and military industry.

Fourthly, in view of the problems of low utilization rate and excess capacity of iron and steel in Yunnan, the enterprise should increase the export of iron and steel, so as to solve the problems of low utilization rate and excess capacity to a certain extent. With the help of "one belt one road" platform, infrastructure projects should be undertaken in countries along with the road. Contract for the development and set up factories for raw materials (such as minerals) production in these countries. At the same time, enterprise should establish a preventive measure to deal with political risks, so as to make sure the survival of iron and steel enterprises in foreign countries, as well as safety of the employees. On the one hand, iron and steel enterprises should make some reasonable development strategies and plans to cope with economic risks. When undertaking infrastructure construction projects in other countries and building factories overseas, the project feasibility and risk assessment shall be carried out in advance; prepare for various risks in the process of project implementation, with a reasonable expected rate of return for the project. On the other hand, subsidies and encouraging policies can be reasonably used to reduce the incidence of economic risks. The steel enterprises should grasp the "one belt one road" platform to strengthen cooperation with western countries and the European Union in the field of eco-friendly steel production, by learning and improving new steel technology. Research and develop high-end steel production

technology with independent intellectual property rights, and enhance the competitiveness of high-end steel products in the international market.

## 5. Conclusion

The state-owned iron and steel enterprises in Yunnan Province have made some achievements in reducing the excess production capacity, but there are still some respects to be improved. From the perspective of demand, with the rapid development of Chinese economy, in the long term, the continuous improvement of infrastructure and living conditions will lead to the domestic demand for steel products gradually decline. Under this circumstance, state-owned iron and steel enterprises intend to establish an eco-friendly, energy saving and profitable production, they should focus on improving the supply, not only in optimizing products structure and avoiding the production overcapacity, but also developing the non-steel industry, by adopting more resources and the platform of “one belt one road” initiative.

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