Chapter 13
Internationalization

13.1 History Review and Status Analysis

13.1.1 Product Internationalization

1. Increase in Total Exports

In recent years, as the global economy recovers, the demand for steel products in many countries has risen. The international competitiveness of China's steel companies has improved, and therefore, China's steel exports have been greatly increased. All these make China gradually transform from the world's largest steel importer to the largest steel exporter. In 2005, China's steel export volume of steel products exceeded 20 million tons for the first time; China's yearly export volume until 2014 all exceeded 40 million tons, except for 2009; in 2015, steel exports continued growing, reaching an all-time high of 112.4 million tons. In 2016, the steel exports reached 108.49 million tons, declining by 3.5% year-on-year.

The changes of China's steel exports from 2005 to 2016 are shown in Fig. 13.1.

2. Export Coverage Area Expanded, and the Concentration Ratio of Major Exporting Destinations Reduced

China's iron and steel enterprises are actively expanding overseas markets and the number of export destination countries is increasing year by year. From 2005 to 2016, China's steel export destination area continued expanding. In 2005, China exported steel products to 193 countries and regions and the number had increased to 234 by 2016, reaching 96% coverage, increasing by ten percentage points if compared with that of 2005.

With China's rapid increase in steel exports, anti-dumping cases initiated by the developed countries take place frequently. In addition, influenced by the decline in demand for steel products due to the slowing economic growth in developed economies, China has shifted the focus of China's steel exports to Southeast Asia and emerging economies. In 2016, the major destination countries for steel exports

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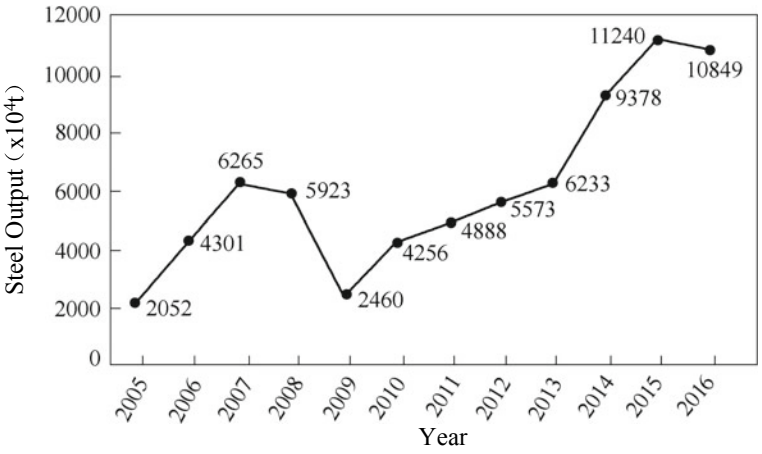

Fig. 13.1 Changes of China's steel exports from 2005 to 2016

were South Korea accounting for 13.2%, Vietnam 10.8%, Philippines 6.0%, Thailand 5.7%, Indonesia 5.4%, Malaysia 3.1%, India 3.1%, Saudi Arabia 2.9%, Singapore 2.7%, and Pakistan 2.7%.

Judging from the changes in the major export destination countries, in 2016, the top 10 destination countries and regions accounted for 55.6% of steel exports, declining 16.9 percentage points from 2005 [1]. The proportions of exports of China's steel export destination countries in 2005 and 2016 are shown in Figs. 13.2 and 13.3, respectively.

3. Structural Optimization of Export Varieties

In 2016, China's cumulative export of steel products was 108.49 million tons, of which sheet and plate exports were 48.02 million tons, accounting for 44.3% that was 10.3 percentage points lower than the highest proportion of 58% in 2010; rod

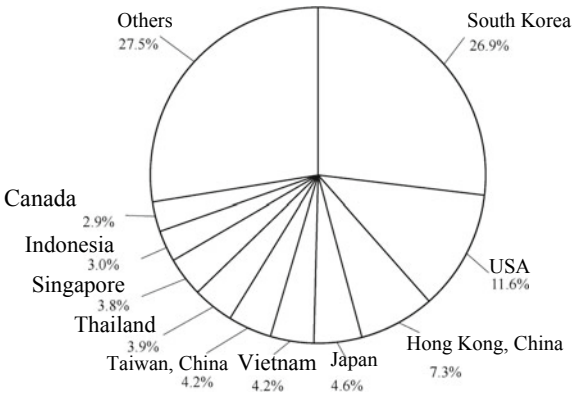

Fig. 13.2 Proportion of exports of China's steel export destination countries in 2005

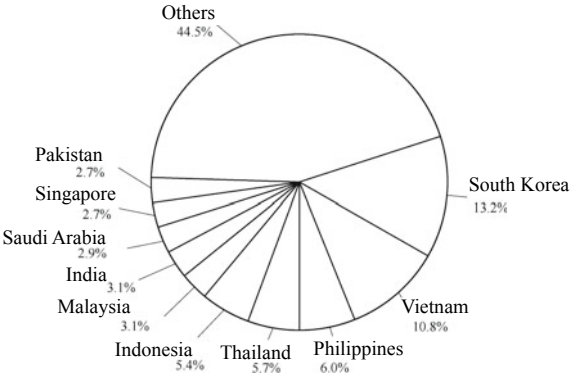

Fig. 13.3 Proportion of exports of China's steel export destinations in 2016

and wire exports were 41.25 million tons, accounting for 38%, a big increase than the previous peak 10% in 2009; the exports of pipes were 9.67 million tons, accounting for 8.9% that was 17 percentage points lower than the highest proportion of 26% in 2009. The proportion of bar and wire exports increased sharply.

Thanks to China's export policy orientation and the structural adjustment of China's steel products, China's steel export structure continues to optimize itself, and the proportion of high value-added export products has increased. In 2016, the average export prices of China's sheets and plates, rods and wires, pipes, angles and sections were 514 US dollars/ton, 336 US dollars/ton, 811 US dollars/ton, and 408 US dollars/ton, and their export volumes accounted for 45.3%, 25.5%, 14.4%, and 3.8%, respectively. Judging from the unit prices of steel products exported in 2016, the unit prices of plates and strips and pipes are higher, and the unit prices of rods and wires are the lowest.

The rapid increase in the exports of high value-added products in China has created a greater profit margin for enterprises. At the same time, it has created favorable conditions for enterprises to build a good image of international brands and enhance their international competitiveness.

4. The Analysis of Steel Export Competitiveness

The competitiveness of high-end products needs to be improved. The international market share of China in exporting plates has surpassed Japan in only a few years. If considering the low price advantage, we can say that China's competitiveness in the high-end plate industry is actually not as good as Japan. From the perspective of steel imports, China's competitiveness of high-end steel products is nowhere near that of Japan and other countries. The labor productivity of China's manufacturing industry is much lower than that of Japan, Germany, and South Korea.

The technological innovation does not match the scale of the iron and steel industry. The output of China's crude steel production is the world's largest, but the patents in steel industry are only 54% of Japan's. It can be concluded that the innovation power of China's steel industry does not match the industry scale. At the beginning of the twenty-first century, when the world steel production center moved from

Japan and South Korea to China, there was no revolutionary production technology emerged. China's innovation capacity in iron and steel industry still has room for improvement.

5. Major Problems in Steel Exports

   (1) Frequent trade conflicts increase exporting difficulties. In recent years, the USA, the European Union, and ASEAN have frequently initiated trade remedy investigations on Chinese steel products. In the first half of 2017, China's products encountered 37 trade remedy investigations initiated by 15 countries and regions, including 28 anti-dumping cases, 4 anti-subsidies, and 5 safeguard investigations; the total amount of money involved was 5.3 billion US dollars. In the same period of 2016, the number of trade remedy investigations in China reached an all-time high, totaling 65 cases, involving an amount of 8.5 billion US dollars. In the first half of 2017, the number and amount of trade remedy investigations against China dropped significantly, but compared with the same period of the past five years, the overall change was small and was still at a high level.
   (2) Global steel production capacity is in excess and steel export prices are falling. According to the annual statistics of the International Steel Association, in 2016, the global steel overcapacity further intensified. The global crude steel output reached 1.63 billion tons, increasing 0.8% year-on-year; the annual crude steel capacity utilization was about 70%, which was in a downward trend; the per capita apparent consumption of steels in the world continued to decline, the oversupply of the global steel market intensified, and the average price of steel continued to drop, greatly reducing the profit margin of China's export steel products. In 2016, the average export price of steel products from China was 502 US dollars/ton, declining 10% year-on-year. In the next few years, many countries in the world will continue to invest in building steel production capacity. At the same time, the steel consumption power brought down by economic growth is insufficient, and the oversupply of steel will continue to intensify. Therefore, China's steel export prospect is not optimistic.
   (3) The steel export trade mode lacks diversity and the export added value is low. In recent years, China's export of plates and strips has continued to rise, but importers are still dominated by foreign steel traders and its export model is single. Compared with the world well-known plates producers building overseas trade mode of steel products such as POSCO in Korea and Nippon Steel in Japan, China's iron and steel enterprises have not made significant progress in optimizing services and increasing product added value due to the lack of a vertical sales system established with foreign users, which has weakened the competitiveness of China's plates and strips in overseas market. The vertical sales system for plates and strips established for foreign users is mainly to build a steel processing and distribution center, a steel processing center in the production area where the main customers are located, to process the products based on the customer's needs, to provide

customers with timely and accurate steel cutting, processing, and logistics services, and also to provide customers with a higher-level quality services and convenient and diversified services for steel processing and distribution centers through EVI activities in the relevant areas to collect steel demand dynamics and technical information. The establishment of overseas steel processing and distribution centers, on the one hand, can improve the industrial chain of plates and strips of the production enterprises and increase the added value of products; on the other hand, it can provide quality services for downstream users and enhance the competitiveness of China's plates and strips production enterprises in overseas markets.

Furthermore, except HBIS, the overseas outlets of China's iron and steel enterprises mostly adopt overseas representative offices which lack control over overseas markets. China's iron and steel enterprises should learn from the experiences of HBIS which are to adopt joint stock, acquisitions, and other methods to work together with large-scale steel sales companies abroad in expanding overseas sales channels.

(4) The dependence on steel exports and on major exporting destination countries is high. In 2016, China's apparent dependence on steel exports was 9.5%, an increase of 2.3 percentage points over 2005. As China's export dependence increases, the risk of steel exports increases. In 2016, the steel products exports to China's top ten importers accounted for 55.6%. Among them, exports of steel products to South Korea, Vietnam, the Philippines, Thailand, and Indonesia accounted for 41.1%. Considering the political factors such as territorial disputes and anti-Chinese sentiment between China and Southeast Asian countries in recent years, the export environment of the top ten destination countries is not optimistic and the export risks are increasing.

13.1.2 Capacity Internationalization

1. Status Analysis

Since 2006, China's crude steel capacity utilization rate has shown a significant downward. It is especially true for the years since 2013 when the indicator has continued going below the reasonable level, reflecting the fact that the overcapacity problems are prominent, as shown in Fig. 13.4. "*Opinions of the State Council on the Development of the Steel Industry to Resolve Excess Capacity to Eliminate Poverty*" (National Issue [2016] No. 6) clearly states that "encourage enterprises, if conditions permit, to participate in the 'Belt and Road' initiative and carry out international capacity cooperation to transfer part of the production capacity in the principle of mutual benefits". At the same time, the local governments have also introduced policies to encourage iron and steel enterprises to combine the overseas

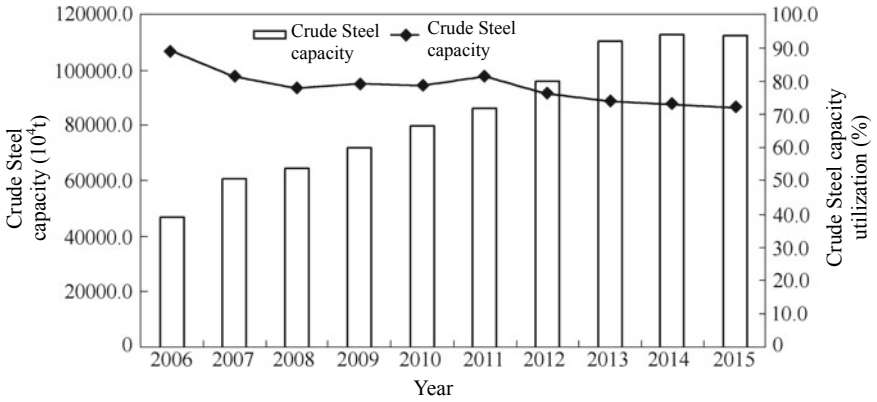

Fig. 13.4 Crude steel production capacity and its utilization rate in China from 2006 to 2015

mineral resources development with deep processing of overseas resources, developing mineral resources in areas rich in mineral resources and investing in building steel production and processing bases, and to extend the industrial chain of smelting and processing. In the 2017 Report on the Work of the Government by the State Council, it reiterated that "International capacity cooperation should be expanded". Adhere to the enterprise-oriented, government-driven, and market-oriented operation and implement a number of major demonstration projects. Implement and improve fiscal, taxation, and financial support policies, establish RMB overseas cooperation funds, and make good use of bilateral capacity cooperation funds. Promote equipment, technology, standards, and services to go abroad and make the "Made in China" shine.

China's iron and steel enterprises have established overseas plants since the 1990s. In recent years, with the slowdown in domestic steel demand growth and the stimulation of the "Belt and Road" strategy, investment mania to the Belt and Road countries has gained momentum and iron and steel enterprises are making investments actively in setting up overseas factories. In January 2014, NISCO, together with GGS (PT Gunung Gahapi Sakti, a subsidiary of the Indonesian Gunung Steel Group), jointly built a steel plant in Medan, Indonesia, and it will reach a production scale of 1 million tons of steel within five years. In May 2014, the Vietnam-China Iron and Steel Plant jointly established by KISC and VN Steel was officially put into operation. The annual output of the first phase project was 500,000 tons of pig iron and 500,000 tons of steel billets. After the completion of the second phase of the project, the production capacity will double. In September 2014, HBIS concluded a cooperation intention with South African Industrial Development Corporation and China-Africa Development Fund. And now, they have started the construction of a 5 million tons steel project. In March 2015, China Metallurgical Group Corporation, Ma Steel, and Kazakhstan Ferrum Corp. jointly signed a memorandum of joint ventures for building a 1 million tons/year integrated steel plant project. In September 2015, WISCO and West Africa signed an agreement to build and operate a joint venture steel plant

with an annual output of 500,000 tons of steel in Liberia, West Africa. In April 2016, HBIS acquired the Smeder Revo Steel Plant in Serbia by means of asset packaging and acquisition [2], which is a major achievement since the promotion of the "Belt and Road" initiative and the international capacity cooperation with Central and Eastern European countries.

In addition, a number of large private iron and steel enterprises in Hebei Province are also actively planning to "go global". The projects currently under construction include Bazhou Xinya Metal Products Co., Ltd. acquiring 30% equity of Indonesian Java Pacific Co., Ltd. to expand production of galvanized steel strip and furniture pipes, and three enterprises including Xingtai Delong Iron and Steel Co., Ltd. and Thailand's Permsin Steel Company have jointly established a 600,000-ton hot-rolled narrow strip line in Thailand. Projects to be finished include a 300,000 tons/a steel plant project jointly established by Qinhuangdao Tonglian Group and First Pacific Mining (Lao) Co. Ltd., and a 2 million tons/a steel plant project in the first phase in Indonesia jointly built by Wu'an Yongcheng Casting Co., Ltd. and Indonesia Lippo Group. Handan Yuhua Iron and Steel Co., Ltd. has signed a cooperation intention [3] to build a 2 million to 3 million tons/a steel project in the Indonesian Chinese Park. In addition, a number of iron and steel enterprises such as Huarui Casting Pipe, Tianzhu Iron and Steel, Guofeng Iron and Steel, Ganglu Steel and Donghai Iron and Steel have also stepped out and conducted field visits and cooperation negotiations with some countries along the "Belt and Road".

2. Pending Problems

At present, China's steel production capacity "going out" is mainly focused on countries of Southeast Asia, Africa, and West Asia. With the help of policies, the "going out" of China's steel production capacity will continue to accelerate in the future. Compared with exports, it is easier to avoid trade conflicts by using joint-stock enterprises as platforms or building factories abroad, but at the same time, political factors, overseas regulations, local customs, infrastructure, environmental assessment, land acquisition, employment systems, etc., may hinder domestic steel enterprises to "going out". The main challenges faced by Chinese iron and steel enterprises in their current "going out" efforts include the following points.

(1) Market capacity is small and environment could be hostile. At present, the steel market in Southeast Asia, Africa, and other countries is generally small in capacity, and a business with a local production capacity of more than 3 million tons is deemed super-large. One million ton production capacity, if transferred to these countries, is big enough to change the local supply landscape and exert competitive pressure on local iron and steel enterprises. Therefore, it is easy to be regarded as an enemy by local competitors who will use their power to force the government to introduce new restriction policies.
(2) High environmental protection costs and strict inspection. Different from the development path of China's past "treatment after pollution", people of Southeast Asian countries are deeply influenced by the Western countries, so they put forward the high-demanding environmental protection requirements while

building and developing the country. Therefore, Chinese equipment transported to ASEAN countries will face more strict environmental protection review and incur greater environmental protection expenditures. This also results in many projects denied or, although approved by government, put on hold or suspended due to public opposition.

(3) Imperfect legal system and disordered competitions. The tax system in Southeast Asian countries is still not perfect, officials are corrupt, and many local enterprises do not pay taxes in accordance with the tax law. Faced with such disorderly competition in Southeast Asia, compliant Chinese enterprises can only be treated unfairly and bear corresponding losses.

(4) Lack of talents and high cost of employment. Although there are many labor force in Southeast Asia and Africa, many of them have basically zero or have just started the steel industry. It is very difficult to find a large number of talents needed in the steel industry. If talents are introduced from the Chinese market, the cost will rise and the local labor cost advantage will not be exerted. Training for locals also costs a lot of time.

13.1.3 Resource Supply Internationalization

1. Iron Ore

   (1) Supply Status China's iron ore supply develops in three stages: the first stage see mainly domestic ore supply; domestic mines could basically meet the demand for iron ores in China's steel industry. In the second phase, ore supply is based on the long-term ore supply contracts (negotiated pricing); as China's iron and steel industry's demand for iron ore increases, the scale of imported ore gradually increases. Thanks to the booming development and trade globalization, the international trade of iron ore also gradually matured and formed its own specific trading practices and price mechanism in the early 1980s, namely the annual pricing long-term mechanism. In the third phase, long-term ore and spot ore coexisted (index pricing, swaps, futures); the traditional iron ore long-term agreement pricing mechanism was shifted to a more flexible pricing mechanism. In addition to pricing indexation, iron ore financial derivatives have emerged in recent years, such as the iron ore swap transactions of the SGX, the iron ore futures of India, and the Chinese iron ore futures of the Dalian Commodity Exchange of China.

   In recent years, due to the sharp increase in demand for iron ore in China, and because the growth rate of China's finished ore production is not as fast as demand growth, China's imported iron ore and external dependence have increased year by year. The internationalization of iron ore supply has been continuously enhanced. The increased import volume from 275 million tons in 2005 to 1.024 billion tons in 2016 [4] made the external dependence increase from 50.2% in 2005 to 87.3% in 2016, as shown in Fig. 13.5.

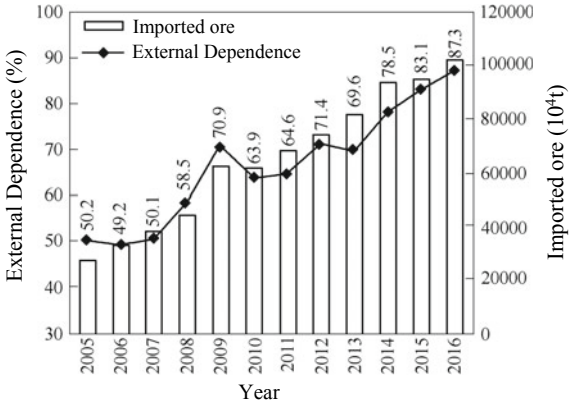

Fig. 13.5 Changes in the scale and external dependence on imported iron ore in China in recent years

At present, the main sources of iron ore used in China's iron and steel industry are mainly domestic and imported. In 2016, China's domestic iron raw ore production was 1.281 billion tons [5], and after the mineral processing process, the iron ore was provided as finished ore for the iron and steel industry. In 2016, China imported 1.024 billion tons of iron ore [4]. From the perspective of variety, nearly all of domestic ores are iron ore concentrates after undergoing the mineral processing process (including magnetite and hematite, of which magnetite accounts for 3/4), while imported ore includes iron concentrate, ore fines, lump ore, pellet, and burnt pyrites, among which ore fines are majority, reaching 739 million tons, accounting for 72.2% of the imported ore, as shown in Fig. 13.6.

Among the imported iron ore, the supply sources are mainly from three countries. In 2016, the top three sources of iron ore were Australia, Brazil, and South Africa, and their supply volumes were 639.87 million tons,

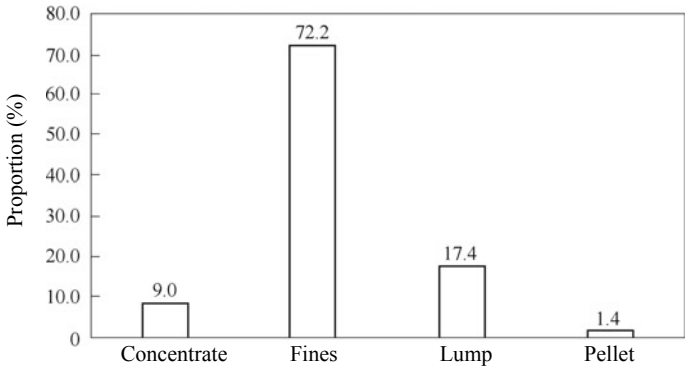

Fig. 13.6 Proportions of iron ore imports in 2016 by variety

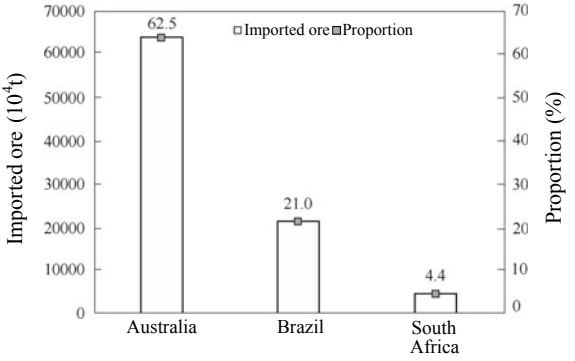

Fig. 13.7 Proportions of the top three countries in iron ore supply in 2016

214.69 million tons, and 44.85 million tons respectively, and the ratios were 62.5%, 21.0%, and 4.4%, respectively. The three countries together accounted for 87.9% of the total imported ores. However, the relatively dependent and too concentrated procuring channels will bring price and supply risks. See Fig. 13.7 for details.

(2) The International Layout of Iron Ore Supply. China's overseas iron ore development began in the 1980s. Since the twenty-first century, especially after 2005, the price of iron ore sharply has been increasing sharply and Chinese enterprises has begun to develop iron ore overseas on a large scale and the investment in iron ore abroad is accelerating. At present, China needs to import a large amount of iron ore every year, but the proportion of equity ore is low, which has caused huge losses to the iron and steel industry; although China has made a lot of efforts in upgrading its equity ores, it still faces many difficulties in carrying on projects due to insufficient experience in overseas ore investment. The development of Chinese overseas investment in iron ore can be divided into the following four stages.

The first stage (1980–2000): China's steel production was not large, the price of iron ore was low, and the impact of resources on the iron and steel industry was not particularly prominent. The overseas resources investment was inactive, and only two overseas iron ore joint ventures on the development and acquisitions were successfully carried out, namely Sinosteel-Australia Channar and Shougang Peru Iron Ore.

The second stage (2000–2008): China's steel output expanded rapidly, resource demand increased sharply, and iron ore prices continued to rise at a high speed, which brought certain impact to the safe operation of the iron and steel industry. Enterprises gradually attached importance to the establishment of the resource security system and a fever of investing on overseas mines through joint ventures and acquisitions swept the country.

The third stage (2008–2012): China's steel production further increased. The iron and steel industry was paying more and more attention to the stable supply of raw materials and market risks. It came at the time when

the country was gradually implementing a basket of policy measures to deal with the economic crisis and, as a result, many enterprises were "going out" to develop overseas resources in that period.

The fourth stage (2012–present): Due to the sluggish recovery of the world economy and the fact that few overseas Chinese investments were successful, Chinese enterprises have taken cautious in overseas investment and there were only two cases, as shown in Table 13.1.

Expansion of international investment on iron ore resources shows that Chinese enterprises have accelerated steps in "going out" in recent years. According to statistics, from 2006 to 2016, the overseas iron ore equity investment of various types by Chinese enterprises totaled more than 24.6 billion US dollars, and Chinese investors participated in the exploration, design and construction of 31 large overseas iron ore projects. As of 2016, the proven and controlled reserves of the mine-related projects by Chinese investors were about 98 billion tons. The planned equity ore production capacity was about 270 million tons, accounting for 54% of the total production capacity of finished ores of 500 million tons in the projects involved.

China's overseas investment in iron ore is mainly concentrated in Western Australia, Quebec, Canada, and West Africa. Among them, there are 18 cooperative projects in Australia possessing high iron ore grades and abundant resources, accounting for half of all overseas projects; there are mainly five projects in Canada including WISCO Group; there are mainly three projects including Guinea Simandou Iron Ore invested by Aluminum Corporation of China and other enterprises in West Africa.

(3) Current Problems

1) Despite a great amount of resources, and a large planning and development area, the rich ore resources and the actual output are small. As of 2014, only 15 mine projects have been put into operation, and the actual supply of equity finished ore is only 83 million tons/year, accounting for 10% of total imports. Compared with countries such as Japan and Europe with more than 50% equity ore proportion, China still has a long way to go.
2) The supporting infrastructure is weak, which restricts the development of ore exploration. Geographically, China's overseas iron ore projects are mostly located in remote places, lacking supporting infrastructure such as railways, ports, and power plants. Some of these problems require the Chinese investors to solve through huge investment, and some are subject to third parties.
3) Insufficient research in the early stage. Preliminary researches on projects were mostly defective, such as insufficient exploration, unclear geological conditions, and failure in conducting ore dressing test. This not only increases the risk and uncertainty of subsequent resource development, but also adversely affects the progress of the project.

Table 13.1 List of development progresses of overseas iron ore resources

No.	Country	Name of overseas ore	Name of enterprises	China	China proportion of shares/%	Joint venture time	Putting into operation time
I	1980–2000						
1	Australia	Channar	Channar Joint Venture	Sinosteel	40	1987	1990
2	Peru	Peru Iron Ore	Shougang Peru Iron Ore Co., Ltd.	Shougang	98.4	1992	1992
II	2000–2008						
3	Brazil	Agua Limpa Iron Ore	Baohuarui Mining Co., Ltd.	Baosteel	50	2001	2001
4	Australia	Paraburdoo Eastern Ranges Mine	Baoruiji Ore Mine Co., Ltd.	Baosteel	46	2002	2002
5	Australia	Wheelarra Iron Ore Mine	Wheelarra Joint Venture	Tang Gang, Wuhan Iron and Steel, Ma Steel, Shagang	40	2004	2004
6	Russia	Berezov Iron Ore Mine		The Western Group	100	2005	Early stage
7	Vietnam	Guisha Iron Ore	Vietnam-China Minerals and Metallurgy Co., Ltd.	Kunming Iron and Steel	45	2005	2006
8	Australia	Sino Iron Ore	Mineralogy	CITIC Pacific MCC Group	100	2006	2012
9	Australia	Karara Iron Mine	Gindalbie Metals	Anshan Steel	69.3	2007	2012

(continued)

Table 13.1 (continued)

No.	Country	Name of overseas ore	Name of enterprises	China	China proportion of shares/%	Joint venture time	Putting into operation time
10	Argentina	Sierra Grande		MCC Group	70	2007	Production
III	2008–2012						
11	Australia	Cape Lambert Iron Ore		MCC Group	100	2008	Feasibility study
12	Australia	Weld Range Iron Ore	Midwest	Sinosteel Group	100	2008	Feasibility study
13	Australia	Mount Gibson Iron Ore	Mount Gibson Mining Company	Shougang	40	2008	Production
14	Australia	Bungalow Magnetite Iron Ore		Baosteel	50	2008	Early stage
15	Madagascar	Solala Iron Ore	Hong Kong WISCO Guangxin Jinhua Resources Co., Ltd.	Wuhan Iron and Steel Guangxin	80	2008	Early stage
16	Cameroon	Lobi Iron Ore	Sinosteel Cameroon Co., Ltd.	Sinosteel	97.5	2008	Exploration
17	Australia	Eyre Iron Ore	CXM	Wuhan Iron and Steel	60	2009	Feasibility study
18	Australia		FMG	Hunan Hualing	17.4	2009	Production
19	Australia	Extension Hill	Extension Hill Co., Ltd.	Chongqing Iron and Steel Company (CISC)	60	2009	Feasibility study

(continued)

Table 13.1 (continued)

No.	Country	Name of overseas ore	Name of enterprises	China	China proportion of shares/%	Joint venture time	Putting into operation time
20	Brazil		MMX of EBX Group	Wuhan Iron and Steel	21.52	2010	Production
21	Sierra Leone	Tonkolili Iron Ore		Shandong Iron and Steel Group	100	2010	Shutdown
22	Liberia	Liberia State Mine		Wuhan Iron and Steel China-Africa Development Fund	100	2010	Production
23	Guinea	Simandou Iron Ore	SIMFER	Chinese Consortium	41.3	2010	Feasibility study
24	Canada	Century Iron Mines Corporation (Sunny Lake, Duncan, Attikamagen Projects)	Century Iron Mine Co., Ltd.	Wuhan Iron and Steel	40	2011	Early stage
25	Canada	Lac Otelnuk Project\December Lake Project	ADI	Wuhan Iron and Steel	60	2011	Early stage
26	Canada	Kami Iron Ore Project	Alderon Iron Ore Company	HBIS Group	25	2012	Pre-feasibility research
27	Canada	Tuktu Iron Ore Project	Advanced Explorations Inc	Xinxing Cathay International Group Co., Ltd.		2012	Exploration
28	Canada	Astray-X	Northern Star Minerals Ltd.	Xinxing Ductile Iron Pipes Co. Ltd.		2012	Exploration

(continued)

Table 13.1 (continued)

No.	Country	Name of overseas ore	Name of enterprises	China	China proportion of shares/%	Joint venture time	Putting into operation time
29	South Africa	PMC Mining Industry		HBIS Group	74.5	2012	Production
IV	Since 2012						
30	Mexico	ZANIZA Iron Ore Project	Mexico MINOSA Company	Xinxing Hanfang		2013	
31	Australia	Aquila Mining Company		Baosteel	85	2014	Early stage

4) High production cost and weak anti-risk ability. At present, most of the overseas iron ore mines invested by China produce low-grade ore with a grade of about 30%. It is necessary to increase investment in construction of ore dressing, power plants, water intake facilities, etc. Most of the projects require large investment in supporting infrastructure and suffer from long transportation distance, high construction cost, and high cost of mining and dressing. Therefore, the projects generally cost a lot. It is estimated that the average FOB cost of overseas ore is 58 US dollars/ton, and the average CIF cost is as high as 79 US dollars/ton. Compared with the average cost of 20 US dollars of the major international iron ore producers, the competitiveness is weak and the cost is higher than that of the domestic mines of 75–85 US dollars/ton.
5) Investments are generally high. The overall average investment on the projects is above the medium level among international iron ore investors, and 20% of them is at the high level in terms of international iron ore investment.
6) Lack of unified management leads to vicious competition. In recent years, many iron and steel enterprises and related enterprises in China have recognized the necessity and importance of overseas resource development and have "gone out" to develop iron ore projects in flocks. However, due to the lack of national unified planning, enterprises are fighting their own battles and vicious competition among enterprises and financial institutions is not in rare cases, which has led to failure of some overseas projects or made it difficult to survive for some overseas mining projects.

2. Coal

(1) Supply Status In 2014, the world's proven reserves of coal resources were 891.5 billion tons [6], in keeping with that in 2013, with 403.2 billion tons anthracite and bituminous coals and 488.3 billion tons of sub-bituminous coal and lignite. The top three were Europe and Eurasia, Asia Pacific and North America. According to the 2014 mining level, the static guaranteed period of proven recoverable reserves of coal was about 110 years.

In 2015, the world's coal production was 7.861 billion tons [4], which was 4% lower than the 8.165 billion tons in 2014. The decrease was mainly attributable to China. It is estimated that the world's coal production in 2016 is about 7.45 billion tons, a further decrease of about 5% from 2015. The decrease is mainly attributable to China, the USA, and Indonesia.

The regional pattern of coal consumption can be roughly divided into 70.0% in Asia Pacific, 12.4% in North America, 13.9% in Europe and Eurasia, 2.6% in Africa, 0.8% in Central and South America, and 0.3% in the Middle East.

In 2015, China's iron and steel industry consumed 650.22 million tons of coal [7], of which the physical consumption of coal was 140.6 million tons, and the actual consumption of coke was 387.25 million tons, equivalent

to the consumption of washed coal of 509.62 million tons. By types of coals, coking coal consumption was about 509.6 million tons, injection coal consumption was 97 million tons, and anthracite and thermal coal for sintering were 43.6 million tons. In the same year, China's iron and steel industry imported 47.84 million tons of coking coal and did not import other coals. The external dependence on coking coal was 9.38%.

In 2016, China's iron and steel industry consumed 645.94 million tons of coal, of which the physical consumption of coal was 152.84 million tons, and the actual consumption of coke was 374.70 million tons, equivalent to the consumption of washed coal of 493.10 million tons. By types of coals, coking coal consumption was about 493 million tons, injection coal consumption was 105.4 million tons, and anthracite and thermal coal for sintering were 47.4 million tons. In the same year, China's iron and steel industry imported 59.23 million tons of coking coal and did not import other coals. The external dependence on coking coal was 12.01%.

From 2015 to 2016, China's imported coking coals by countries are shown in Table 13.2 [8].

(2) The International Layout of Iron Ore Supply. In the period from the reform and opening up to the end of the 1990s, China's coking coal was mainly exported in exchange for foreign exchange, and the import volume was less than 200,000 tons in most of the time, which is very small. With the rapid development of China's iron and steel industry, the demand for coking coal increased sharply. The turning point happened in 2004 when the coking coal imports exceeded the exports for the first time. Since then, the import volume has been increasing and hit staged record high in 2013 with imported coking coal being 75.39 million tons.

Table 13.2 China imported coking coals list by countries from 2015 to 2016 [5]

No.	Name of country	2015 quantity/$\times 10^6$ t	2016 quantity/$\times 10^4$ t	Remarks
1	Russia	323	260	
2	Canada	571	518	
3	The United States	12	0	
4	New Zealand	0	54	
5	Indonesia	23	57	
6	Malaysia	1		
7	Mongolia	1272	2356	The second in import volume
8	Kazakh	0	1	
9	Australia	2555	2677	The largest in import volume
	Total	4784	5923	

In order to meet the domestic needs on coking coal, since the beginning of the twenty-first century, some large state-owned enterprises such as Shenhua Group have invested in the mining and production of coal mines through joint stock or holdings in Mongolia, Russia, Australia, the USA, Canada, etc., and some private enterprises have also made their own investments and hold shares in some coal mines in Mongolia, Russia, Australia, and other countries.

China's iron and steel enterprises have started late on investment of overseas coal mines, and the numbers are few. And their focus is on the investment of exploration and production of coking coal through joint stock. For example, Baosteel invested and held shares in Australian coal mines, and HBIS Group and Shougang held shares in Canadian coal mines. But the results of investment are not as expected and the main problems lie in the poor prediction on the long-term trend of coal prices and the lack of all-round talents who familiarize laws of different countries possesses good value judgments on coal mines and investment estimates.

13.2 Development Environment and Policy Orientation

13.2.1 The Necessity of International Development for Iron and Steel Enterprises

At present, the domestic environment and international environment faced by the Chinese economy are far more complicated. On the one hand, the international economy is going through profound adjustment, international trade is growing at a low rate, and disparity between developed economies and emerging economies is further enlarged; the FED raises interest rates and the prices of bulk commodities such as oil and iron ore are on the downside, which causes global financial and commodity market fluctuations; geopolitical conflicts are endless, and uncertainty and instability have further increased. On the other hand, the downward pressure on the domestic economy has increased, the challenges faced by the real economy have multiplied, and the risk of economic inertia drop and the systemic risks fueled by the superposition of fluctuations in the real economy and financial markets have continued building up. Under such circumstances, it is of great strategic significance to further promote the going out drive, accelerate the construction of the "Belt and Road" initiative, and enhance international capacity cooperation. The "Belt and Road" initiative is an overall strategy for China's opening-up and international economic cooperation in a long period of time to come. To implement the "going out" strategy in the new era, we must take the "Belt and Road" strategy as a guide, strengthen overall planning and guidance, and take all measures to establish all ties with the Belt and Road countries and regions so that policies are compatible, facilities are connected, trades

are smooth, transactions are circulated, and people-to-people ties are strengthened. International capacity cooperation is the main focus and platform for promoting the "Belt and Road" initiative and is also a new feature and a new task in a stage for implementing the strategy of going out. Therefore, it plays a vital role.

First, it is conducive to expanding China's economic development space. In order to maintain rapid economic growth during the 13th Five-Year Plan period, we must speed up the pace of going out, expand external development, accelerate the export of advantageous production capacity and equipment such as steel, shift focus from exporting products to outputting industries and capitals, and maintain the balance of international payments by compensating deficit under capital item using the surplus under trade item. Second, it blazes a new path for promoting economic transformation and upgrading. On the one hand, China's iron and steel industry has developed a large amount of high-quality production capacity, advanced and practical equipment, mature and reliable technology and enjoys outstanding cost performance and unique external advantages; on the other hand, domestic resources and environmental constraints have intensified, labor costs continue to rise, and steel overcapacity is increasingly prominent. Therefore, we must actively promote the transformation of the development mode, shifting from quantitative growth to quality benefits, effectively cut the overcapacity in domestic steel production through international capacity cooperation, transfer excessive and high-quality production capacity, boost structural reform, and enhance supply-side quality and efficiency. Third, it helps develop a high-level open economy. China's foreign economic structure is undergoing profound changes. Innovations must be made to create new ways of foreign investment. We must vigorously promote international capacity cooperation and shift focus from the export of consumer goods to the output of investment goods, and from focusing on imports to laying equal stress on imports and exports. Fourth, it helps implement a mutually beneficial and win-win strategy at a higher level. At present, developing countries and emerging economies are continuing to promote industrialization and urbanization. Developed countries are accelerating industrialization, transforming existing infrastructure. Promoting international capacity cooperation in industries such as steel industry provides opportunities of linking the supply and demand of countries at different development stages and boosting the organic integration of global industrial chains, which is conducive to improving China's discourse power in global economic governance.

13.2.2 The Government's Policies Supporting the International Development of Iron and Steel Enterprises and the Macroeconomic Environments

Internationally, the world economy is undergoing profound adjustment, the recovery is sluggish, international trade growth remains slow, financial and bulk commodity

markets are volatile, geopolitical risks are on the rise, and uncertainties and instabilities in the external environment are increasing, the impact on China's development should never be underestimated. Domestically, the problems and risks escalated in a period of time are further manifested, economic growth gears down, structural adjustment pains and replacement of old growth drivers with new ones are intertwined, and economic downward pressure is increasing. Now, it is an important opportunity for Chinese industries such as iron and steel industry to carry out international capacity cooperation. The National Development and Reform Commission and the Ministry of Foreign Affairs jointly compiled the "*Country Wise Planning for International Capacity and Equipment Manufacturing Cooperation*". In the near future, a regional production cooperation pattern consisting of "one axis and two wings" and including 45 key countries will take shape with the China's neighboring countries on the main axis and Africa, Middle East, and Central and Eastern Europe on the west wing, and Latin American countries on the east wing, aiming for steady development of international capacity cooperation.

According to the instructions of the State Council, relevant departments compiled the *"13th Five-Year Plan" for International Capacity Cooperation*. Twelve key industries including steel industry, nonferrous metals industry, and building materials industry will play core role. The global layout of industries must be designed as whole system with key projects leading the way; the countries near and along the "Belt and Road" will be given the priority and strategies on each country shall be systematically designed in order to deepen multi-bilateral pragmatic cooperation. The government will release the *"Regulations on Overseas Investment",* further enhancing the autonomy of enterprises in investment, and leaving focus on strengthening the in-process and after-event supervision and supporting services. We will increase efforts in coordinating major projects for overseas investment cooperation and standardizing market competitive order. We will strengthen statistical analysis and operational monitoring of capacity cooperation in key countries.

The fiscal and taxation financial support policy will favor strategic projects in international capacity cooperation. By expanding the special funds for foreign trade and economic development and scaling up "concessional loans and preferential export buyer's credit", we will flexibly adjust sovereign loans or sovereign guarantee policies to further improve tax policies. We will increase policy-based and open financial supports, accelerate the overseas establishment of financial institutions, and encourage the use of domestic and foreign capital markets and bond markets to finance for going out projects. We shall effectively give play to the role of foreign exchange reserves, steadily expand the scale and coverage of entrusted loans, and give full play to the investment promotion role of investment and financing platforms such as CIC, Silk Road Fund, and CNIC Co. Ltd. We shall put emphasis on strategic pivotal landmark projects in the fields of steel, cement, nonferrous metals, electric power, infrastructure, etc., accelerate the construction of the "Belt and Road" initiative and international capacity cooperation, vigorously implement the action plan on construction of high-speed railway network, express roads, airline network, and industrialization in African, and participate in construction of infrastructure of surrounding

countries for connectivity and overseas projects of economic and trade cooperation zones, and accelerate the formation of relevant production capacity overseas.

13.3 Case Analysis

13.3.1 Pohang Iron & Steel Co., Ltd.

1. Internationalization Overview

The development history of Pohang Iron and Steel Co. Ltd. (hereinafter referred to as POSCO) can be roughly divided into three stages, namely the start-up period from 1968 to 1997, the rapid development period from 1998 to 2007, and the strategic adjustment period from 2008 to this day. At present, its industrial scale measured in production of crude steel has registered over 40 million tons. In the 1990s, POSCO began to implement the strategy of "Make Expansion Overseas with Epoch-Making Technology". With high-end technology and products in its possession, it has pursued the strategy of globalized steel industry and expanded its international market share through overseas projects. The main focus of overseas expansion was China and Japan and gradually shifted to emerging economies such as India, Vietnam, and Indonesia, and then reached out to Brazil, Mexico, the USA, Turkey, and other European and American countries. After years of meticulous cultivation, it has basically established its existence in the world as an international steel industry player.

POSCO's internationalization strategy adopts a gradual development model, and its development stages are shown in Table 13.3 [9].

2. Analysis on Internationalization Experiences

POSCO invests in and builds bases and technical service centers for steel production and steel processing in emerging economies to seize markets in Southeast Asia and the Middle East and consistently strengthens precision marketing targeting at high-yield regions and industries on a global scale. At the same time, it increases the supporting exports of high value-added technologies. With a global vision of building steel capacity, its businesses, branches, and manufacturing plants spread across Asia, the Americas, and Europe.

POSCO entered the Chinese market in 1991 and established POSCP (China) Investment Co., Ltd. in July 2003 to provide business support for its investment corporations in China in conducting business activities and made investment in expansion by planning and expanding the steel processing centers. POSCO established a

Table 13.3 Globalization history of POSCO

1972–1993	1993–2001	2002–2010	2010–now
Exploration period before market entry	Market entry period	Market expansion period	Internationalization stage

strategic existence by building steel processing bases in China's coastal areas and entered the Chinese market with the output of "high-end" products and technologies. Thanks to these efforts, it has expanded its scale, improved service quality, and expanded diversified sales channels in a continuous way [10].

It sets up steel production enterprises. From 1991 to 2011, POSCO established five steel production enterprises including Pujin Company in Dalian, Pohang in Zhangjiagang, Pohang in Shunde, Guangdong, Pohang in Qingdao, and Benxi Steel-Pohang Rolling Company. The enterprises boasted over 2 million tons of cold rolling annual production capacity, 1 million tons of galvanizing annual production capacity, and stainless annual output reached up to 1 million tons.

Prepared and expanded steel processing centers. In Tianjin, Qingdao, Foshan, Suzhou, Chongqing, and other cities, more than 30 integrated steel plate processing centers for producing automobile steel plates, stainless steel plates, electrical steel, and color-coated plates with an annual processing capacity of over 3 million tons have been built, which has increased its products' market share.

Built model steel mill and exported FINEX technology. POSCO and Chongqing Iron and Steel Co., Ltd. built a FINEX integrated demonstration steel plant by applying the FINEX-CEM technology to produce high-quality steel plates and wires with a focus on serving the industries like automobiles, home appliances, and architectural ornament. The export of FINEX technology in China marks the beginning of forming a business model featuring the export of steel technology. POSCO can also get the royalty in such model. The building of integrated demonstration steel mills will help POSCO to make expansion to India, Southeast Asia and the Middle East.

(1) Global Steel Projects Steel projects and steel processing centers mainly produce automotive sheets, stainless steel cold-rolled coils, and other products [11]. See POSCO's major overseas projects of flat steel products in Table 13.4 for details.

In order to meet the rapid development of the automotive and home appliance industries in all major regions around the world, POSCO has also established coil processing centers in foreign countries, which is easier than building a large steel plant in the local area. POSCO built six coil processing centers in Japan, followed by coil processing centers in Mexico, Poland, China, Thailand, and Vietnam, etc. Currently, POSCO has more than 50 coil processing centers around the world with an annual processing capacity of more than 5 million tons.

(2) Steel Products Processing Centers POSCO built its first steel processing center in Thailand as early as 1998. Afterward, processing centers were built in Malaysia, Indonesia, Vietnam, and the Philippines. At present, POSCO has 10 steel processing centers in the Southeast Asian market with an annual processing capacity of about 1.15 million tons. This provides a sound pivot for the development of POSCO in the ASEAN countries. The distribution of processing centers is shown in Table 13.5.

3. Conclusions

POSCO's industrial expansion model is to establish legal entities in overseas regions, build integrated steel plants and steel processing bases through joint venture or M&A,

Table 13.4 POSCO's major overseas projects of flat products

Description	Annual capacity/$\times 10^4$ t	Place	Time of completion
Processing Center	2.4	India	February, 2012
Galvanizing Line	45	India	May, 2012
Non-oriented Electrical Steel Plant	30	India	October, 2013
Cold Rolled Coil Plant	180	India	January, 2015
Equipment Relocation of No. 1 FINEX	150	India	April, 2019
Stainless Steel Cold Rolled Coil Plant	8.5	Vietnam	Started from 2009
Stainless Steel Cold Rolled Coil Plant	15	Vietnam	Started from March, 2012
Cold Rolling Mill	120	Vietnam	September, 2009
Integrated Steel Plant	300	Indonesia	December, 2013
Cold Rolling Mill	120	Thailand	2009
Stainless Steel Plant	30	Thailand	Production expansion completed in 2015
Electrogalvanizing Line	18	Malaysia	2007
Galvanizing Line	3	Myanmar	1999
Galvanizing Line	40	Mexico	June, 2013
Stainless Steel Cold Rolled Coil Plant	20	Turkey	April, 2013
Integrated Steel Plant	300	Brazil	Middle of 2015
Steel Pipe Plant	27	The United States	2009
Integrated Steel Plant (FINEX-CEM)	160	Iran	2019

and set up technology service centers to increase the export of high value-added technologies (such as FINEX-CEM). Extending the upstream and downstream industry chain, making continuous innovations, understanding and integrating into foreign cultures are POSCO's way "to make overseas expansion with the epoch-making technologies" [12].

(1) In its global expansion, POSCO sets eyes on the local steel demand in energy, home appliances, construction, electronics, and other industries, makes targeted overseas strategic investment, and gives priority to downstream processes and the automotive industry.
(2) By closely cooperating with the downstream industries and building steel processing centers in emerging markets, POSCO has been actively carrying out overseas expansion as well as expanding its deep processing capacity of high value-added steel products such as automobile sheets, electrical steel, and stainless steel. It aims to increase products' added value, provide more customer-oriented services, and expand the market share.

Table 13.5 Distribution of POSCO's steel products processing centers

Name	Country	Address	Time of put into operation	Annual processing capacity/$\times 10^4$ t
POSCO-TBPC	Thailand	Chonburi	1998	12
		Rayong	2006	12
		Wellgrow Industrial Zone	2009	12
POSCO-MKPC	Malaysia	Rawang	2006	14
		Port Klang	2009	12
POSCO-VNPC	Vietnam	Hai Duong Province	2007	12
POSCO-VHPC		Ho Chi Minh City	2008	15
POSMI	Indonesia	Bekasi	2002	8.5
POSCO-IJPC		Karawang	2006	12
POSCO-PMPC	The Philippines	First Philippine Industrial Park (FPIP)	2009	5

(3) The expansion of overseas production capacity by means of joint ventures cannot only make up for the lack of global management capabilities via local partners, but also enable it to achieve cultural compatibility.

Overseas investment is full of risks and challenges. Political ecology, economic foundation, environmental protection policies, and other factors will affect the success of the projects. Meanwhile, enterprises are confronted with risks like being highly dependent on the market, debts, rating, laws, and project delay. But in the long run, it is right decision to stick to the strategy of "focusing on emerging markets and meeting the local growing demand for steel by procuring local raw materials". Due to the limited capacity in the domestic market, future capacity expansion will basically resort to building plants overseas. The long-range plan is to achieve a crude steel capacity of 71 million tons in 2020, of which overseas production capacity will reach 26 million tons, accounting for 36.6%.

13.3.2 ArcelorMittal

1. Internationalization Overview

The ArcelorMittal Group is currently the world's largest steel group and the largest steel multinational enterprise. It is known for its largest "cross-sector" and cross-border M&A, the fastest growth speed after M&A, and the highest success rate

of M&A in the world. Lakshmi Mittal, the founder and chairman, established his own steel company (LNM) in 1980; from 1986 to 1995, LNM Group acquired a series of steel mills that were in trouble at that time in different countries (including Canada, Mexico, Ireland, Trinidad, Tobago, Britain, Germany, and Indonesia); in 2004, after the acquisition of the US International Steel Group, a blockbuster around the world, the Mittal Steel Group (LNM Group) was incorporated. In 2006, it acquired the Arcelor Steel Company in Europe and formed the ArcelorMittal Group. The headquarters was therefore moved to Luxembourg from the Netherlands.

Through 130 M&As of poorly managed small steel plants and 2 M&As of world-class large enterprises in just 20 years, ArcelorMittal Group has emerged as the largest steel enterprise in the world. Its business covers both the emerging markets and mature markets and has occupied a leading position on a global scale in the fields like automobiles, construction, household appliances, and packaging. According to incomplete statistics, ArcelorMittal Group possesses more than 60 steel plants in 27 countries and regions in Europe, Asia, Africa, and the Americas. Its annual production capacity of crude steel is about 130 million tons, and that of pig iron is about 72.1 million tons. With nearly 330,000 employees in more than 60 countries across the world, the group has been described as "developing at the speed of the Internet in the steel industry".

2. Analysis on Internationalization Experiences

The prerequisite for the success of ArcelorMittal Group is: clear positioning—global strategy. Prior to the Mittal Group, there were no real global steel enterprises in the world. At that time, the so-called world-class steel companies were mostly formed by acquiring the steel companies in their own countries. The US International Steel Group and Arcelor Group in Europe were among them. Some even thought that "steel industry can never be globalized and will always be a regional industry". Mittal aimed to become the "Henry Ford" in the steel kingdom—not only to rule but also bring changes to the operating model in the entire steel industry.

The first step of ArcelorMittal Group toward success was the formulating of a development path of making mergers and acquisitions and transforming loss-making state-owned enterprises. It acquired endangered small steel mills for expansion at low cost and turned losses into gains through reducing the operation cost and utilizing the modern processing technologies and management concepts. After the oil crisis, the steel industry fell into a long-term downturn. Global steel demand remained stagnant for a long time and steel industry was once considered as a sunset industry. However, during this period, what Mittal did was to acquire the "garbage enterprises" in others' eyes. For example, in 1992, the third largest steel company in Mexico, SIBAISA Steel, was caught in great difficulty because it had no orders with an operation rate of only 25%. While the Mexican government wanted to privatize it, Mittal spent only $220 million on acquisition of this highly modernized steel conglomerate with $2.2 billion government investment. The company's production line with an annual output of 330,000 tons of welded pipes, port equipment, and mines with 3 million tons of iron ore were among the acquired. After Mittal's transformation, the company's output tripled in less than five years, becoming the largest steel manufacturer and

exporter in Mexico. Following the initial success, Mittal acquired many small steel companies suffering from surplus labor, backward technologies, and poor operation at low prices in such low-cost regions as Poland, Romania, Kazakhstan, and the Czech Republic.

The key to the grand success of ArcelorMittal Group is the real-time adjustment of its global M&A strategic focus, which means to move from the strategy of "low-cost M&A" to "mastering the high-end ones". Thus, it has achieved a leap-frog transition from large enterprise to a strong one. When it came to the twenty-first century, the steel industry witnessed a cyclical peak. The growth of steel demand finally brought the international steel industry to a fast-growing track. With its growing strength, Mittal made a timely adjustment of the strategic focus in the transnational operation, aiming at becoming the globe master in steel industry, based on the trend of globalization and multinational enterprises' rapid development. It sets eyes on mature markets and targeted at the world's top steel enterprises. By launching a series of M&A battles against the world's top companies, it formed a high-end multinational business network system with monopoly and a global coverage in the steel industry. In 2004, Mittal Steel was listed in Amsterdam and New York through 16% assets of its subsidiary "Ispat International". This opened the window for the group's capitalization process, and then it merged the assets of Mittal and Ispat. It then acquired US International Steel Group with approximately $4.5 billion in "cash and stock", therefore forming the Mittal Steel Group. After the acquisition of such world-class enterprises, Mittal Group's annual steel output reached 70 million tons with an operating revenue of $32 billion. Mittal became the world's largest steel producer surpassing the then Arcelor Group. In 2006, Mittal made another effort to acquire Arcelor Steel spending huge sums, which took up a dominant position in the high-end steel market. The ArcelorMittal after merger boasted an annual production capacity of 120 million tons, which was three times of that of the world's third steel enterprise, Nippon Steel, and accounted for 10% of the global steel output. It is the stock market value amounted to 46 billion US dollars, becoming the undisputed emperor in the global steel industry.

3. Conclusions

The secret of ArcelorMittal's success is to pursue a global M&A strategy, make M&A at the most appropriate time, and grow the acquired companies with the smartest business practices so that a leap-forward development from "small to large" and from "large to strong" has been realized. The expansion model of Mittal Group's global M&A strategy is worth learning by China's large steel enterprises:

First is to obtain the largest assets with the least investment. Mittal acquired Karaganda Steel in a scale of 4 million tons/year at a cost of $240/ton steel and acquired Inland Steel at a cost of $315/ton. However, a newly built large steel complex needs $1200/ton in terms of investment.

Second is not only to purchase the hardware of steel plants, but also acquire the software added up over years of production practices, namely production know-how and management experience. In particular, companies like the time-honored Inland Steel possessed great knacks in many fields, such as making steel plates for the

automobiles and large household appliances, which also became property of Mittal Group after acquisition. In addition, Mittal Group were able to take over the original market and blaze new markets in other parts for the group in a rapid way.

Third is to acquire the existing corporate talents apart from obtaining the hardware and software from the steel plant. This allows Mittal Group to quickly take full possession of the talents of operation and management. By virtue of its advanced management and production model, it helps the acquired companies to quickly get rid of the predicament and make contributions to the group.

13.3.3 HBIS Group Co. Ltd.

1. Internationalization Overview

HBIS Group Co. Ltd. (hereinafter referred to as HBIS) is one of the largest steel material producers and integrated service providers in China. It has more than 30 first-level subsidiaries and more than 120,000 registered employees. The Group is mainly engaged in steel materials businesses and sets foot in many sectors like mining resources, financial securities and modern logistics, steel trade, equipment manufacturing, and others. In 2016, its operating revenue stood at 290.8 billion yuan, and the total assets at the end of the year reached 360.4 billion yuan. HBIS was listed among the *Fortune* Top 500 for 9 consecutive years, ranking No. 221 once. It also earned the highest rating, namely "owning extremely strong competitiveness", among the "MPI China Steel Enterprise Competitiveness Ranking" issued by China Metallurgical Industry Planning and Research Institute. HBIS is a member of the Executive Committee of the World Steel Association and the rotating president of the China Iron and Steel Association.

While enhancing strengths and striving for better performance in steel industry, the Group also seeks the strategic transformation in the light of "deepening and broadening industry chain" with a global version across the whole industry chain. By giving full play to the advantages of the entire industrial chain and the resource chain of iron and steel enterprises, it pursues the deepened extension of the industrial chain and the broadened use of the entire resource chain and vigorously expands overseas businesses. Based on the vision of "having resource, market and customers around the globe", it has accelerated the strategic expansion of building global marketing service platform, global technology R&D platform, and global steel manufacturing platform. In recent years, HBIS Group has completed the acquisition of PMC, the largest copper smelting enterprise in South Africa, and the Duferco in Swiss, world's largest steel marketing service provider, thus becoming a multinational group with overseas mature smelting companies and globalized marketing service platforms. HBIS is moving toward the European region which has the high-end manufacturing capability via the acquisition of Serbia's only state-owned large-scale pillar enterprise, Smeder Revo. This has laid a solid foundation for expanding overseas industrial bases and building a global industrial manufacturing platform.

2. Analysis on Internationalization Experiences

As the largest steel conglomerate in China and the second largest in the world, HBIS is committed to building "an international HBIS" and has made remarkable achievements in actively planning overseas manufacturing bases and promoting close cooperation with the mature foreign strategic partners.

In December 2012, HBIS led several domestic enterprises to form a Chinese consortium, and then jointly with South Africa's IDC contributed to subscribing the PMC company in South Africa. HBIS held 35% of its share at a price of $234 million, becoming the biggest shareholder of PMC and dominating the operation management. South Africa's IDC is the second largest shareholder and uses the capital ties to form a community of shared interests. Share acquisition of PMC company in South Africa is the first large-scale overseas M&A project led by HBIS and has set a successful example for Chinese enterprises' investment projects in Africa. In September 2014, HBIS signed an agreement with South African Industrial Development Corporation and China-Africa Development Fund Co., Ltd. to launch the 5 million ton steel project in South Africa, setting a record as the largest whole-process steel project by China in foreign countries.

In November 2014, HBIS announced an equity cooperation project with Duferco Holding Group. HBIS increased its stake in Duferco International Trading Company (world's largest steel trading and integrated service provider) to 51%. At the same time, the comprehensive strategic partnership between Tangshan Steel (a former subsidiary) and Duferco was expanded to the level between the two groups. This equity cooperation is the first time that a China's steel enterprise has acquired an international mature business network, creating a new model for the integrated cooperation between China's largest steel enterprise and the world's largest steel trade and integrated service provider.

In April 2016, building on the strength of the national "Belt and Road" Initiative, HBIS continued to deepen international capacity cooperation and acquired the Smeder Revo Steel Plant in Serbia. After the acquisition, HBIS sent 11 batches of technical teams to Serbia, with a total of nearly 200 people. These teams helped Smeder Revo diagnose and solve its problems in equipment, technology, information application, and process. It took only half a year to reverse the loss lasting seven consecutive years, demonstrating the advantages and capabilities of the Chinese steel industry and HBIS. HBIS's steel plant in Serbia has become a model project in the international capacity cooperation between China and Central and Eastern Europe.

In recent years, HBIS has been continuously increasing its pace of international development via carrying out a series of practices in export channel expansion, financing, talent training, project cooperation, etc. It also carried out close cooperation with Duferco in Switzerland, POSCO in South Korea, South African Industrial Development Corporation, China-Africa Fund, and other companies. At present, HBIS Group has more than 20 subsidiaries or joint ventures in Canada, Australia, Singapore, South Africa, and other countries with more than 5000 overseas employees.

3. Conclusions

The root of the successful experience of HBIS internationalization strategy lies in liberating the mind, adhering to the international development concept and business philosophy. All its practices, like leading equity acquisition of South Africa PMC company, increasing shareholding of Duferco International Trade Co., acquiring the Serbian Smeder Revo Steel Plant, encouraging "brainstorming", inviting well-known experts at home and abroad to give lectures, as well as comprehensively bringing itself in line with the world-class steel enterprises in terms of profitability, marketing model and others, have shown that HBIS is making great endeavor to guide its development with an international version and market-oriented perspective.

The strategy of setting up HBIS overseas manufacturing bases is characterized by high positioning and aims to build model projects for international capacity cooperation. Focusing on the sustainable development of overseas manufacturing bases, HBIS attaches great importance to establishing effective dialog and communication mechanism with local trade unions, associations, and other organizations and actively fulfills social responsibilities while supporting and promoting project construction and enhancing business competitive advantages, which has brought a good reputation for HBIS. The business philosophy, product capability, technical team, and marketing network have laid a solid foundation for building model projects in steel industry's international capacity cooperation.

13.3.4 Tianjin Seamless Pipe Corporation

1. Internationalization Overview

   (1) Historical Origin Tianjin Seamless Pipe Corporation (hereinafter referred to as TPCO) was put into operation in 1992. It is a large-scale modern producer of seamless steel pipes founded in the "Eighth Five-Year Plan" period. Its main processes are steelmaking, tube rolling and pipe processing with imported technical equipment from Britain, Germany, Italy, and the USA, which was at the advanced level in the 1990s.

   Currently, TPCO has a blast furnace of 1,000 m^3 with an annual production capacity of 900,000 tons; two 150-ton ultra-high-power electric furnaces and one 90-ton ultra-high-power electric furnace with an annual steelmaking capacity of 3.3 million tons; six units of ϕ250MPM, ϕ168PQF, ϕ219ASSEL, ϕ258PQF and ϕ460PQF and ϕ720 rotary expander.

   For now, TPCO has developed from a producer of seamless steel pipes into a group corporation that integrates various metallurgical products such as seamless steel pipes, stainless steel plates, color-coated sheets, sponge iron, iron alloy, and copper wire rods.

   (2) Capacity Status In 1992, a 563,000 tons/a, as originally designed, tube line was constructed to produce 500,000 tons seamless steel pipes mainly for

oil casing, among which 350,000 tons were oil casings. At present, TPCO annual production capacity of seamless steel pipes exceeds 3 million tons.

(3) Industry Position Compared with the products of world-famous Sumitomo, TPCO's products enjoy quality indicators comparable in terms of chemical composition, mechanical properties, geometric dimensions, and thread processing accuracy and are very much the same to the physical quality boasted by world-class companies. TPCO is now able to compete with those powerful steel pipe producers around the world.

TPCO is currently the largest production base for oil well pipes and seamless steel pipes in China. It is also the largest producer of seamless steel in terms of single plant's scale. Its process, technology, and equipment levels represent the highest level of seamless steel pipe rolling in the world today, surpassing that of the Sumitomo Metal Co., Ltd. TPCO has already been ranked among the three major groups of seamless steel pipes in the world.

(4) Internationalization Strategy and Achievements TPCO has been actively implementing the international development strategy and has embarked on a characteristic development path from technology introduction, digestion, and absorption to technology export and overseas investment and construction. In 2007, the joint construction of the seamless steel pipe project in the Republic of Belarus marked its shift to technology export from technology introduction. In 2009, the Indonesian oil well pipe processing project was completed and put into production. The first phase of the United States Seamless Steel Pipe Project, China's largest investment project on the steel pipe industry in the USA has been completed and put into operation, and the second phase is in smooth progress.

2. Analysis on Internationalization Experiences

After years of struggles, TPCO's seamless steel pipes are widely sold in foreign countries. TPCO's main product, oil casing, passed the certification of American Petroleum Institute (API) in 1994 and obtained the use rights of API monogram. In early 1996, it obtained the ISO9001 quality management system certification. TPCO's oil castings have been used in major oil fields in China and ended the country's dependence on imported casings. TPCO's products have been exported to nearly 100 countries and regions, and TPCO has become the main force in China's international competition.

TPCO always adheres to the principle of high starting point and high standards. In the earlier stage of construction, TPCO introduced the world's most advanced technologies and equipment in steelmaking, rolling, pipe processing and direct reduced iron from Germany, Italy, the USA, the UK, and other countries. With a complete automation system, it became a professional manufacturer of oil tubes with the most advanced technologies and the largest scale in China in the 1990s. Since its production, it has maintained a leading edge in technologies through continuous transformation. It ranks among the Top 3 steel pipe producers globally in terms of the total output of seamless steel tubes, core equipment and technologies. In March

2005, TPCO and German SMS Meer jointly won the bid of the Belarusian steel pipe project, marking that TPCO realized the transformation from technology import to technology export.

TPCO also has experience in investing in foreign projects and has built a tube processing plant in Indonesia. For establishment of the plant, TPCO and a Singaporean company, Tubulars International Pte Ltd. (TIPL) established a joint venture in Singapore, namely TPCO Pan Asia Pte Ltd., of which TPCO holds 51% of the shares and TIPL holds 49%. Afterward, TPCO Pan Asia Pte Ltd. invested in Indonesia and established PT. TPCO Pan Asia as its production plant. This plant was mainly designed for pipe processing with an annual output of 60,000 tons as designed. The plant produces oil casings, and the business scope covers the production and sales of steel pipes and the related products. The equipment and facilities employed for this project were mainly China-made with a total investment of $9.2 million.

TPCO has established a national-level technical center, possessed an advanced steel pipe processing test line, and enjoyed strong research and development power. TPCO's products have been developed from three steel grades in the original design to 25 steel grades with 235 varieties and tens of thousands of specifications, of which 62 have filled the domestic gap. With 33 national patents, a series of TP products with proprietary intellectual property rights came into being. Its oil casing is awarded as "Chinese Top Brand Products", and the seamless steel pipe is awarded as "National Inspection-Free Product" and "China Brand-Name Export Commodity".

3. Conclusions

TPCO's strategy for international development can be seen as a process starting from product export to technology export and then to capacity export. It first established a marketing network through product export, got to know the local market and the characteristics, and further sought opportunities to promote mature and reliable technologies overseas, gaining more overseas engineering experience. Starting from pipe processing which has relatively easier requirements on process and equipment, it chosen the joint venture method to directly build plants in foreign countries, thus accumulating experience in overseas construction and production management. TPCO has been making solid efforts step by step in a few years and embarked on a road of international development with its own characteristics. All its experiences and lessons are worth learning by Chinese steel enterprises.

13.3.5 Tsingshan Holding Group

1. Internationalization Overview

Founded in 1992, Tsingshan Holding Group is a multinational enterprise that started its career in Wenzhou City, grew bigger to cover Zhejiang Province and China and finally went abroad. It now holds more than 30 enterprises like the Ruipu Technology Group, Qingtuo Industrial Group and Guangdong Jirui Technology Group. In 2016,

the Group's output of stainless steel crude steel stood at 5.8 million tons with a sales value of 102.8 billion yuan, and its total employees reached more than 20,000. As the largest private enterprise in domestic stainless steel industry, Tsingshan Holding Group has been listed among China's Top 500 Enterprises, China's Top 500 Manufacturing Enterprises, China's Top 500 Private Enterprises, and China's Top 500 Private Manufacturing Enterprises.

Tsingshan Holding Group has established three production bases for nickel-chromium alloy smelting, stainless steel smelting, and steel rolling in Lishui (Zhejiang), Fuyang (Fujian), and Yangjiang and Qingyuan (Guangdong). It also owns a 47,000-ha nickel mine base in Sulawesi, Indonesia, and a 5000-ha chrome ore base in Zimbabwe. Building on this strength, Tsingshan Group has formed a complete industrial chain from the exploitation of raw materials of stainless steel such as nickel-chromium ore, nickel-chromium-iron smelting, and stainless steel smelting, to processing of bars, wires and sheets, steel pipe manufacturing, precision wire processing, terminal transportation, and international trade. The companies that the Group holds shares in mainly produces stainless steel ingots, steel bars, plates, wires, seamless pipes, and other products, which are widely used in petroleum, chemical engineering, machinery, electric power, automobile, shipbuilding, aerospace, food, pharmaceutical, decoration, etc. The Group has a well-established marketing network at home and abroad, and its sales channels covers the entire country and has extended to Southeast Asia, Europe, and America. It has established direct sales outlets in Wenzhou, Shanghai, Wuxi, and Foshan.

2. Analysis on Internationalization Experiences

Facing the grave situation of highly fluctuating international nickel prices, overcapacity of the domestic stainless steel industry, market downturn, and shrinking profit margins, Tsingshan Group has greatly leveraged its advantage and potential by acquiring and utilizing the high-quality mineral resources overseas, integrating mining companies and stainless steel production enterprises, and securing pricing discretion. By now, Tsingshan Group has obtained the mining rights of the nickel ore in Indonesia and chrome ore in Zimbabwe and has successively built plants in the mining area, making it a true multinational enterprise. In addition, the "RKEF + AOD" process for stainless steel production adopted by Tsingshan Group can save more than 20% of the cost, thus setting the lowest and most internationally competitive deadline for stainless steel production in the world.

The early action in deploying resources in the mining and export businesses of nickel ore in Indonesia as well as the ferronickel smelting industry chain constitutes a key link in the global layout of Tsingshan Group. In 2009, Tsingshan Group and Indonesia Eight Star Investment Co., Ltd. jointly established the Sulawesi Mining Investment Co., Ltd. and obtained the mining rights of the 47,000-ha laterite-nickel ore in Indonesia. In February 2010, the company's first batch of nickel ore from this mining area in Indonesia was successfully shipped to China. In October 2013, President Xi Jinping and former Indonesian President Susilo held a signing ceremony for the China-Indonesia Business Agreement in Jakarta. Listed as one of the

projects under the framework of this agreement, Qingshan Industrial Park in China-Indonesia Economic and Trade Cooperation Zone in Sulawesi, Indonesia was signed successfully.

In 2014, the Indonesian government began to implement export restrictions on raw ore, which completely banned the export of nickel ore. Tsingshan Industrial Park had become the fastest-constructing and most successful foreign-invested mining project with the fastest capital injection in Indonesia after the prohibition policy was launched. The planned land area of the park is over 1300 ha. It is mainly equipped with a thermal power plant with a total capacity of more than 1,000 MW, a 100,000-ton-level wharf, a simple airport and a living area with a total construction area of about 200,000 m^2. The total planned investment currently is $5 billion. The ferronickel smelting and the supporting thermal power plant project in Phase-I occupied an area of 95 ha and was put into trial operation in January 2015. In April 2015, the first ship laden with 22,000 tons of ferronickel left the port, marking the official operation of Phase-I ferronickel smelting project of Tsingshan Industrial Park. In May 2015, Indonesian President Joko attended the ribbon-cutting ceremony of Tsingshan Industrial Park in the China-Indonesia Economic and Trade Cooperation Zone. The Phase-II ferronickel smelting and supporting thermal power plant project of the industrial park was completed and put into operation in March 2016. In June of the same year, a one million ton/a stainless steel line was completed. In April 2017, the Phase-III ferronickel smelting project was officially put into operation. The project constructs a total of 20 RKEF production lines to produce 1.5 million tons ferronickel a year. In addition, the Phase-IV 600,000-ton ferrochrome and 700,000-ton cold rolling projects are under construction. Tsingshan Holding Group signed a 3.5-million ton steel works investment agreement in June 2017 with Delong Co., Ltd. and Eight Star Group.

3. Conclusions

There is experience in three perspectives worth learning from Tsingshan Group's global layout: the first is that enterprises should define their own industrial positioning, accumulate funds, and experience for production and operation, timely track the market trends in domestic and international market, and seize the opportunity to occupy international resources; second is that enterprises should pay attention to the state-to-state relations between China and foreign countries, adapt to the changes of local political environment and economic trends, and strive to raise its business to the attention of strategic cooperation among countries so that there will be favorable policies in resource allocation at home and abroad; third is that enterprises should strengthen the research and development of advanced technologies and process, integrate and extend the industrial chain, keep the technology, quality and cost controllable to enhance the core competitiveness.

13.3.6 Magang (Group) Holding Co. Ltd.

1. Internationalization Overview

Magang (Group) Holding Co. Ltd. (hereinafter referred to as Masteel) is a large-scale iron and steel complex and an important steel production base in China with a production scale of 20 million tons. In 2016, its crude steel output reached 18.63 million tons with a total asset of 85 billion yuan. The operating income stood at 55.1 billion yuan with a total profit of 976 million yuan. For a long time, Masteel has been paying great attention to internationalized development and has scored remarkable achievements. On the one hand, Masteel uses joint ventures with overseas consortiums and famous enterprises to sell its products to more than 50 countries and regions in Europe, the Americas, Southeast Asia, etc. On the other hand, the Group establishes strategic partnership with many internationally renowned companies like the United StatesGE, GermanySiemens, Danieli, DB, and KoreaPOSCO to enhance brand influence in the international market. In addition, with the successful development of a number of high-end products such as corrosion-resistant steel, weather-resistant H-beam, low-noise wheels, and 40-ton high-power locomotive wheels by Masteel, its competitiveness in the international market has been increasing and it has won recognition from many well-known overseas manufacturers. By now, Masteel's wheels have obtained the AAR Certification for American railway products, EU Railway Industry Standard Certification, German IRIS International Railway Industry Standard Certification, and its H-beam has obtained the certification of American standard, Japanese standard, German standard, and European standard.

2. Analysis on Internationalization Experiences

Against the backdrop that the global steel industry has entered an age of meager profit or even loss, Masteel's lucrative wheel business has made an important contribution to the profit of its main steel business. Upgrading the wheel products, expanding the wheels' market and extending the industrial chain have now become a significant strategy for its development [1]. On May 30, 2014, Masteel acquired the century-old world-renowned brand, SAS VALDUNES in France, at a price of 13 million Euro. SAS VALDUNES, NSSC (Japan), BVV (Germany), and Lucini (Italy) are recognized as the world's four major manufacturers of high-speed axles. VALDUNES was once known as the "Industrial Flower of France" with a history of over 100 years, and it was the only specialized enterprise in producing wheels, axles, and wheel sets. VALDUNES possesses core technologies in high-speed rail wheels, axles, and wheel sets. Its high-speed rail wheels have created a world record of 574.8 km per hour. Suffering from the industrial downturn and other factors, Valdunes' profitability was greatly affected and it then was mired in financial distress. It entered the insolvency proceedings on October 11, 2013, and went into bankruptcy reorganization on March 31, 2014. Through this acquisition, Masteel acquired all the assets of Valdunes, including the real estates, tangible assets, intangible assets and all of Valdunes' inventories and work-in-progress, Valdunes' lease contracts, contracts with the customers, and contracts with suppliers of various types, maintenance contracts,

etc., and kept all of the employees. After this acquisition, Masteel took charge of its high-quality talents who master the core technology and its R&D systems, as well as a series of technical patents of Valdunes high-speed axles. This enables Masteel to make a quick integration of self-owned technologies and the world-leading technologies and create the core technology with independent intellectual property rights, thus promoting the industrialization and high-end process of China's high-speed axle products. Meanwhile, through the acquisition of the Valdunes, Masteel also took over its sales network across more than 40 countries and regions around the world and its seats in a few international organizations like the International Union of Railways and International Railway Industry Standard. This has played an active role in supporting the internationalization process of China's high-speed axle products and increasing the international market share. Gao Haijian, chairman of Masteel, said that, by taking the acquisition of the Valdunes, the Group will build itself into a leading enterprise globally in the full range of high-speed axle products in about 3 years [13].

Expanding overseas markets through reorganization and M&A of foreign superior enterprises are important ways for the "internationalization" of Chinese iron and steel enterprises. Masteel's acquisition of the Valdunes has completely broken the long-term monopoly and blockade of products and technologies in high-speed rail axles to China by foreign countries. By quickly taking possession of the internationally advanced high-speed axle technologies, the Group will help to upgrade China's high-speed axle technologies, accelerate the localization of high-speed axles, reduce the cost of manufacturing, maintenance and use of high-speed railways. Furthermore, it will fundamentally guarantee the safe operation of China's high-speed railways, support the future development of China's high-speed railway with self-owned axles, and support the national strategy of high-speed railway "going out". Masteel is a successful example of the "internationalized development" of steel enterprises.

3. Conclusions

At present, some foreign superior enterprises are affected by the financial crisis. Due to problems such as financial matters and debts, they will or preparing to sell or spin-off assets or businesses in whole or in part. This is a rare opportunity for Chinese companies to implement cross-border mergers and acquisitions and accelerate the "internationalized" development. It is also a strategic pivot in taking the high ground of international advanced technologies, expanding international marketing channels, and enhancing its brand image in the Post-Financial Crisis Era. Through integration, the two parties involved take coordinated steps in system organization, management ideas, production management, and marketing strategies, which can produce "$1 + 1 > 2$" economic benefits and M&A synergy.

13.4 Prospects and Path Analysis of Internationalization Trend

China's iron and steel enterprises have not achieved obvious results under the simple international development model of "going out" for either markets or resources. They have not obtained the expected results in terms of holding resources, expanding markets and increasing profits. In the future, the steel industry will not "go global" simply for internationalization. The international development will pay more attention to efficiency and promotion of the competitiveness of enterprises. The development model will transform from the following five aspects: (1) focus changes from product trade to equal emphasis on product trade and service trade; (2) transform from product's "going global" to capital's "going global;" (3) transform from self-motivated "going global" to organized "going global;" (4) transform from investing in resource sector to investing in manufacturing and service sector; and (5) transform from "going global" of a single enterprise to "going global" of the whole industrial chain by combining both the upstream and downstream enterprises and the related enterprises.

As one of the most competitive industries for "going global", China's steel industry should lay emphasis on the new trend of international development in implementing the internationalization strategy, especially actively participating in the "Belt and Road" Initiative to achieve positive results. Efforts should be focused on the following five aspects: (1) to carry out project cooperation and provide supporting services riding on major development opportunities like the international capacity cooperation; (2) to explore and establish strategic cooperation and restructuring that covers the entire industry chain, and unite the international and domestic strategic partners to deepen industrial cooperation and improve the level and ability of international cooperation; (3) to actively integrate and utilize global innovation resources to make breakthroughs in overseas talent training, international project cooperation, and introduction of overseas high-end talents; (4) to provide value-added supply chain services to global metallurgical enterprises and industrial enterprises, and vigorously develop and cultivate overseas strategic terminal customers depending on the self-owned trading companies or the domestic strategic alliance of trading companies; and (5) to carefully prepare for and seriously deal with international trade frictions so as to safeguard the rights and interests of enterprises and promote sound development of international trade.

13.5 Industrial Practices of Internationalized Development

Responding to the national "Belt and Road" Initiative, China Metallurgical Industry Planning and Research Institute (hereinafter referred to as MPI) has been actively carrying out relevant researches on the production capacity and investment cooperation between China and foreign countries and providing guidance for the "going

global" enterprises of the steel industry and other advantageous ones; entrusted by the National Development Bank to provide consultation for national planning, MPI has sent the researchers for several times to Australia, Africa, South America, the Commonwealth of Independent States, Southeast Asia, and other dozens of countries to conduct field visits. They have made in-depth studies on the exploitation and utilization of mineral resources, put forward planning suggestions to provide decision-making basis for the better cooperation and win-win results between China and foreign countries; MPI developed the consulting business for steel industry with a global perspective and has provided services in market research, feasibility study, equipment procurement, project evaluation, and proposals for domestic and foreign enterprises and institutions; with its long-term commitment to introducing advanced metallurgical technologies abroad, MPI has been keeping close cooperation with many foreign well-reputed universities and academic institutions like the National Metallurgic Academy of Ukraine and the National Titanium Design Institute of Ukraine. MPI has achieved outstanding results in organizing the introduction of RKEF ferronickel production process and GOR converter smelting of stainless steel. In addition, in recent years, MPI has conducted various exchanges and cooperation with relevant enterprises in Australia, Japan, the USA, Austria, Germany, the UK, Italy, Zimbabwe, and others, as shown in Table 13.6.

Table 13.6 Practices of MPI in promoting internationalization of iron and steel industry

No.	Business segments	Segment introduction	Typical cases
1	Researches on Related Issues of the "Belt and Road" Initiative	Entrusted by the National Development and Reform Commission, the Ministry of Industry and Information Technology, and the National Development Bank, the Institute has carried out researches on related issues of the "Belt and Road" Initiative	*Study on the "Going Global" Thinking of the Steel Industry under the "Belt and Road" Strategy* *Planning Research on Capacity Cooperation with African Countries* *Special Report on China-Saudi Arabia Joint Research on Capacity Cooperation in Bilateral Strategic Planning* *Planning Study of China-Jamaica Capacity and Investment Cooperation* *Promotion of China-Pakistan Joint Industrial Zone Project of "Two Parks in Two Countries"* and others

(continued)

Table 13.6 (continued)

No.	Business segments	Segment introduction	Typical cases
2	National Industrial Development Planning Research	Entrusted by the National Development Bank, the Institute carried out consultation on the development of mining and steel industry in different countries	Development planing of the mining and steel industry in Zambia, Sweden, Cambodia, Guinea, Venezuela, Tajikistan, Myanmar, South Africa, Mozambique, Bolivia, Western Africa, etc.
3	Consulting and Information Service for Foreign Companies	Provide research reports and technical advices to foreign companies	It has offered the cost analysis report on producing magnesium alloy to the Boeing Company, bank-level feasibility study report and evaluation report to Rio Tinto Group's Simandou project, research report on the major strategic issues of China's steel industry from 2013 to 2018 to Australia's Arrium Company, and the data information services on "*Blue Paper of China's Steel Industry*" to Oldendorff
4	Consulting Service for Domestic Enterprise's "Going Global"	Provide consulting service for domestic companies' "Going Global"	*Feasibility Study Report on Fuhai Steel Project in Indonesia of Dongfang Mineral Resources Co., Ltd.* *Feasibility Review Report on the Integrated Steel Plant of Bolivia ElMutún Iron and Steel Company* *Evaluation Report of Anshan Steel's Project in Sulawesi, Indonesia* *Project Proposal of China-Egypt 5-Million Ton Steel Base (Phase-I) and others*
5	Introduction of Foreign Advanced Technologies	It has organized the introduction of Ukraine RKEF ferronickel process and GOR converter smelting of stainless steel	*RKEF Ferronickel Project of Baosteel Desheng Stainless Steel Co., Ltd.* *GOR Converter Smelting of Stainless Steel Project of Hebei Taigang Group* *GOR Converter Smelting Project of Southwest Stainless Steel and others*

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