

Research on Industrial Cluster Development of Liaoning Coastal Economic Belt

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Abstract. Since 2009, the development and construction of Liaoning coastal economic belt has been included in the national development strategy, the industrial clusters in Liaoning six coastal cities has made rapid development. Up to now, six coastal cities have a total of 43 provincial key industrial clusters, mainly involves petrochemical industrial clusters, general equipment manufacturing industry clusters, marine engineering equipment manufacturing industry clusters, automobile and auto parts industry clusters, electronic information industry clusters, metallurgy and new materials industry clusters, agricultural product deeply processing industry clusters, photovoltaic and new energy industry clusters, garment and swimsuit industry clusters. These industrial clusters have greatly promoted the local economic growth and increased employment, but most of the industrial clusters are still small, industrial correlation is relatively poor, industrial isomorphism is relatively serious, industry level is low and lack of technological innovation. Liaoning coastal economic belt should develop leader enterprises, foster the innovative chain, and develop high and new technology industries and strategic emerging industries.

Introduction

Liaoning coastal economic belt is located in the coastal areas of Liaoning province, consists of 6 cities: Dalian, Dandong, Jinzhou, Yingkou, Panjin and Huludao (Fig. 1). In July 2009, The State Council approved the "Liaoning Coastal Economic Belt Development Plan", the development and construction of Liaoning coastal economic belt has been included in the national development strategy.^[1]



Figure 1. The location of Liaoning coastal economic belt

Industrial cluster plays an important role in promoting regional economic development and improving regional core competition.^[2-9] In order to expand the strategic adjustment of economic

structure, cultivate new economic growth points, improve the industrial competitiveness, Liaoning provincial government issued the "several opinions on further promoting the development of industrial cluster" in 2011. Up to now, six coastal cities have a total of 43 provincial key industrial clusters.^[10] The distribution of key industrial clusters and sales revenue in 2015 is shown in Table 1.

Table 1 Distribution of key industrial clusters in Liaoning coastal economic belt

City	Number of Key Industrial Clusters	Total Sales Revenue in 2015 (Billion yuan)
Dalian	19	646.2
Panjin	4	163.3
Yingkou	4	144.9
Jinzhou	5	117.7
Huludao	6	59
Dandong	5	37
Total	43	1168.1

The Development of Key Industrial Clusters of Liaoning Coastal Economic Belt

Dalian City. The nineteen key industrial clusters are mainly located in Dalian High-tech Zone, Jinpu New Area, Lushun, Wafangdian and Zhuanghe, mainly involve petrochemical industry, aromatic hydrocarbon, general equipment manufacturing industry, automobile and auto parts industry, electronic information industry and others (Table 2). Main products include fine chemicals, general equipment and special equipment, automobile and auto parts, engine, software and information services, semiconductor integrated circuit, metallic materials, new materials, agricultural products, furniture and medical equipment.

Table 2 Key industrial clusters of Dalian City

Industrial Cluster Name	Key Enterprises	Sales Revenue in 2015 (Billion yuan)
Dalian software and services	IBM, HP, Dell, Neusoft, Huaxin	105.1
Jinzhou equipment manufacturing	Dalian Insulator, Matsushita, SKF	85.3
Jinzhou auto parts	Volkswagen, Deutz, Thyssen Krupp	35.0
Jinzhou electronic information	Intel, Rohm, TDK, OMRON, Alpine	31.9
Jinzhou biomedical	Pfizer, Zhenao, Yalifeng, Innobio	16.3
Dagushan petrochemical	West Pacific, Fujia, Yisheng, Kaifei	58.6
Dalian Dengshahe steel	Donbei Special Steel, Huicheng Al	17.0
Changxing Island petrochemical	PetroChina, Hengli Petrochemical	19.0
Coastal equipment manufacturing	COSCO, CFHI, China Shipbuilding	38.7
Lushun ship supporting	COSCO Shipbuilding, Jinjia Ship	11.5
Huayuankou new material	BYD, BAK, HG Lithium, JM Boron	10.3
Songmu Island chemical	Dahua Group, Pride chemistry	14.5
Dalian automobile	Dongfeng-Nissan, Chery, Brilliance	11.1
Zhuanghe agricultural products	Shandao, Fugu, Shangpintang	41.7
Zhuanghe machine tool	Huafeng, Huaxia, Wanpeng, Kemain	45.4
Zhuanghe furniture	Donghao, Boda, Zhuoyuan, Baihui	17.3
Wafangdian bearing	Wafangdian bearing, Yuandong Bearing	50.4
Dalian garment	TRANDS, PARKLAND, Xincheng	29.1
Pulandian power equipment	Dalian Mutual Inductor, North MI	8.0

Panjin City. The four key industrial clusters are mainly located in Panjin High-tech Zone, Liaodong Bay Area, Panjin Fine Chemical Industrial Park, mainly involve fine chemical industry, petroleum

equipment industry, plastic industry and marine engineering equipment manufacturing (Table 3). Main products include methyl tert butyl ether, asphalt and rubber, lubricating oil, drilling rig, offshore drilling platform, special ship and plastic film.

Table 3 Key industrial clusters of Panjin City

Industrial Cluster Name	Key Enterprises	Sales Revenue in 2015 (Billion yuan)
Petrochemical and fine chemical industry	North Huajin Chemical, CCP	101.5
Petroleum equipment manufacturing	CPLEC, Pipe Drill, Tianyi Petro	34.1
Marine equipment manufacturing	ZW Aluminum, Liaohe Heavy	4.9
Plastics and new materials	Jintian Plastic, Shengyou Rubber	22.8

Yingkou City. The four key industrial clusters are mainly located in Bayuquan District, Dashiqiao and Xianren Island, mainly involve metal processing industry, petrochemical industry and automobile maintenance equipment industry (Table 4). Main products include magnesium products, iron and steel products, asphalt and plastic products, automobile lifting machine, and tire dynamic balance instrument.

Table 4 Key industrial clusters of Yingkou City

Industrial Cluster Name	Key Enterprises	Sales Revenue in 2015 (Billion yuan)
Magnesium products and processing	Qinghua Group, Jinlong, Qunyi	83.4
Bayuquan iron and steel	Anshan Steel, North Steel Pipe	20.3
Xianren Island petrochemical	CNOOC Asphalt, Kanghai Petro	24.6
Automobile maintenance equipment	Taida Automobile Maintenance	16.6

Jinzhou City. The five key industrial clusters are mainly located in Jinzhou Binhai New Area, Linghai and Yixian, mainly involve photovoltaic and new energy industry, petrochemical and fine chemical industry, special metal industry, automobile and auto parts industry, and metallurgical materials industry (Table 5). Main products include industrial silicon, polycrystalline silicon, monocrystalline silicon, silicon wafer, solar cell, vehicle fuel oil, isopropyl alcohol, lubricating oil additive, rubber, propane, aromatic hydrocarbon, titanium dioxide, silicon manganese, molybdenum chemical products, automobile electrical appliance, suspension, air bag, container, coke, silicon and manganese alloy and ductile iron pipes.

Table 5 Key industrial clusters of Jinzhou City

Industrial Cluster Name	Key Enterprises	Sales Revenue in 2015 (Billion yuan)
Photovoltaic and new energy	Solar Energy, Boyang Photovoltaic	15.3
Petrochemical and fine chemical	PetroChina, Jiahe, Tianhe, Heisenberg	45.7
Titanium and special metal	CITIC, Baoti, Xinhualong Molybdenum	16.0
Automobile and auto parts	Wonder Auto, Hanna, Oriental Container	23.4
Metallurgical materials	Fengan, Yuehua Marine, Raoxin Elly	17.3

Huludao City. The six key industrial clusters are mainly located in Huludao Northport Industrial Park, Huludao High-tech Zone, Xingcheng, and East Daihe, mainly involve petrochemical industry, swimsuit industry, marine equipment industry, molybdenum processing industry, valve industry and digital technology industry (Table 6). Main products include polyurethane, swimsuit and fabrics, marine engineering equipment, molybdenum concentrate, nonferrous metal, fluid machinery and valves, IT products and high-tech digital products.

Table 6 Key industrial clusters of Huludao City

Industrial Cluster Name	Key Enterprises	Sales Revenue in 2015 (Billion yuan)
Polyurethane petrochemical	PetroChina, Fangda Chemical, CNOOC	40
Swimsuit and fabrics	Jiulong, Tiancheng, Xiadie, Yilang, Sanqi	15
Marine engineering equipment	Bohai Shipbuilding, Dongbao, Jiangzhe	14
Molybdenum deep processing	Wonder Auto, Hanna, Oriental Container	3
Pumps and valves	Lianshan Molybdenum, MCC, HLD Zinc	0.5
Digital technology	Guoxing Tech, Legu Soft, Ninestar Tech	1.5

Dandong City. The five key industrial clusters are mainly located in Dandong Harbor Industrial Park, Dandong High-tech Zone, Fengcheng and Kuandian, mainly involve automobile and auto parts industry, instrumentation industry, protective textile industry, Manchu medicine and health industry (Table 7). Main products include large and medium bus, SUV, special vehicle, auto parts, booster, automation and control instruments, scientific instruments, protective textile, medical instruments and Manchu medicine.

Table 7 Key industrial clusters of Dandong City

Industrial Cluster Name	Key Enterprises	Sales Revenue in 2015 (Billion yuan)
Automobile and auto parts	SG Automotive Group, 518 Engine Parts	12
Instrumentation	Dongfa, Oriental Controlling, Huari, Aolong	7.5
Protective textile	Star Fine Chemicals, Huaxing Textiles	7
Fengcheng auto booster	Shenlong, Oriental, Phoenix, Green Booster	6
Manchu medicine and health	Dandong Pharmaceutical, Kangchen PHA	4.5

The Main Achievements. In 2015, 34 of the 43 key industrial clusters' sales revenue are over 10 billion yuan. 6 industrial clusters of Dalian City have been identified as the national new industrialization demonstration base, Dalian software and outsourcing services industrial cluster is the first cluster that reached 100 billion yuan in China software industry. Dandong instrumentation industrial cluster is one of the three major production bases in China, Fengcheng auto booster production accounted for 1/4 of China. Dashiqiao was named "China magnesium capital". Panjin petrochemical and fine chemical industry is the first cluster that reached 100 billion yuan in Liaoning province. Huludao swimsuit network sales accounted for about 70% of the country. In short, these industrial clusters have greatly promoted the local economic growth, increased employment, and promoted the regional competitiveness.

The Main Problems of Key Industrial Clusters of Liaoning Coastal Economic Belt

Scales of Industrial Clusters Are Still Small. In 2015, only two key industrial clusters' sales revenue are over 100 billion yuan, nine key industrial clusters' sales revenue are less than 10 billion yuan. The average of sales revenue of Dandong key clusters is only 7.4 billion yuan. Huludao pumps and valves industrial cluster's sales revenue is only 0.5 billion yuan.

Industrial Correlation Is Relatively Poor. Some clusters are only the same link in the industrial chain, industrial chain is short. Some clusters have less communication and interaction, the upstream and downstream supporting relationship is not strong, the effect of industrial agglomeration is not fully demonstrated.

Industrial Isomorphism Is Serious. Six coastal cities have an obvious industrial isomorphism, Petrochemical industrial clusters are developed in Dalian, Panjin, Jinzhou and Huludao; metallurgical industrial clusters are developed in Dalian, Yingkou, Jinzhou and Huludao; automobile and auto parts

industrial clusters are developed in Dalian Dandong, Jinzhou and Yingko; equipment manufacturing industrial cluster are developed in Dalian, Panjin and Huludao.

Industrial Level Is Low. Petrochemical, metallurgy, machinery manufacturing and other traditional industries still dominates, seriously affected the quality of environment. The proportion of emerging industries (such as energy saving and environmental protection, information industry, bio industry, new energy, new energy vehicles, high-end equipment manufacturing and new materials) is still very low.

Lack of Technological Innovation. Most of the industry is still in the low end of the industrial chain, produced low value-added products, independent innovation capability is limited. Some enterprises don't want to innovative technologies, and don't have the strategic awareness and sense of crisis.

Countermeasure and Suggestions

Develop Leading Enterprise. Select the key enterprises that with high technological ability, strong market competitiveness and leading role of industry as the leading enterprises. Support the technological innovation, brand cultivation and market expansion, make these leading enterprises become the core power of industrial technology innovation.

Build the Industrial Chain and Foster the Innovation Chain. Investment needs to focus on the industrial chain, and avoid new overcapacity. Cultivate the innovation chain composed of a variety of innovative activities, including knowledge creation and transfer, generic technology development and service, system integration technology research and development, engineering innovation, innovation support and industrialization service.

Strictly Control Industrial Isomorphism. Deeply investigate the key industries in the six coastal cities, evaluate the similarity and relevance, analyze the relationship between technical structure and product supply and demand, build cross industry and cross regional industrial chain, strictly control industrial isomorphism, and achieve coordinated development.

Develop High-tech Industries and Strategic Emerging Industries. Based on existing industry and resources, put priority on the development of advanced equipment manufacturing in Dalian, new plastic materials in Panjin, metal processing in Yingou, photovoltaic and new energy in Jinzhou, marine engineering equipment in Huludao, and Manchu medicine in Dandong, and pay more attention to the "high" and "new".

Promote the Transformation and Upgrading of Liaoning Coastal Cities Based on Innovation Driven. Liaoning provincial government should carry out the top-level design of Liaoning innovation driven development, accelerate reform of institutions and mechanisms, increase motivation for pursuing innovation-driven development, establish a new system for developing modern industries, and create new favorable conditions for developing the open economy.

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