An Analysis of Developing Strategies for the Industrial Clusters

Case Study of Liaoning Province in P.R. China

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Abstract

Industrial cluster is an industrial organization mode formed from many enterprises and interrelated institutions with a certain geographic concentration. It is an effective way for the development of regional economy, and featured with agglomeration, symbiosis, flexibility, embeddings, etc. This paper first analyzes industrial clusters' development and issues in Liaoning province, and then discusses the strategies of developing industrial clusters, such as implementation of the "innovation-driven" strategy, cultivate new industries and develop emerging markets, promoting ecological industrial clusters, etc.

Keywords: Industrial cluster; Innovation-driven; Industrial chain; Eco-industrial cluster

Introduction

The origin of the "cluster" comes from ecology, which refers to the biological populations living in the same habitat with the symbiotic relationship. M. Potter (1990) combined the two word industry and cluster together and proposed the concept of "Industry cluster ". He pointed out that the industry cluster is geographic concentration of interconnected companies and institutions in a particular field. Industrial cluster is one of the most popular topics of economic research as a unique and widespread form of industrial organization. Especially under the economic globalization, regional competition is an important form of international competition. As an important industrial organization mode to enhance regional competitiveness, industrial cluster is an effective way for the development of regional economy, as well as the bright spot for regional economic growth, and even the foundation of national competitiveness.

Liaoning is well known as “the Equipment Department of the Republic”. Especially after the implementation of a series of important initiatives, such as “the revitalization of the northeast old industrial base”, “the national strategy to establish the Liaoning Coastal Economic Zone”, the designation of the Shenyang Economic Zone as “an area to experiment the comprehensive and systematic national reform of modern industrialization”, as well as the nomination of the Changxing Island as one of “the National Economic and Technological Development Zone”, the cultivation and development of the industrial clusters in Liaoning has made significant progress. Eight industrial parks, such as equipment manufacturing, petrochemical, etc. have been awarded the “exemplary national modern industrialization bases”. However, compared with the economically developed regions and internationally, the development of the industrial clusters in Liaoning with regard of both scale and competitiveness, still lags far behind.
In 2011, the Liaoning provincial government issued “Opinions on further promoting the development of industrial clusters” as an effort to develop the industrial clusters in Liaoning Province rapidly with good quality and a scientific approach. This paper analyzed the general characteristics of industrial clusters; discussed theoretically and practically in depth the reality issues arise in the process of nurturing and development of industrial clusters in Liaoning, emphasized on the factors that affect the development of industrial clusters in Liaoning, put forward workable, practical proposals for development of industrial clusters.

Properties of industry clusters

Generally speaking, industry clusters have the following properties.

1) Spatial agglomeration

Industrial cluster is a collection of a large number of related enterprises gathering in a particular geographic area with highly dense economic activities. The spatial agglomeration is an external manifestation and basic characteristic of industrial cluster. On one hand, the enterprises in the cluster share a variety of resources to save the costs of productions; on the other hand, it is easier for them to build mutual trust and cooperation, and reduce transaction costs and trading risk, thus improving the efficiency of market transaction.

2) Symbiosis

Industrial cluster symbiosis means that the enterprises in the cluster are mutually beneficial and complementary, and just like an organic combination which has to grow and develop together. By reducing various types of cost, the member enterprises in the cluster region can get more benefits than those stay alone in other regions. The advantage of industrial cluster symbiosis comes from the following two aspects: the first one is the benefit of economy of scale. The enterprises within the industrial cluster are in the same related industry chain, and take the advantage of geographic concentration to carry on the production and sale together through joint venture, cooperation, and alliance etc. Thereby the competitiveness of industrial clusters can be greatly improved with the benefits and efficiency of economy of scale achieved. The second one is the benefit of cost-effective. The member enterprises within the cluster can share technology, information, material resources and infrastructure, and thus the production and transaction costs can be reduced.

3) Cooperation and Competitiveness

With the foundation of specialization and collaboration, the enterprises in the cluster generally have higher productivity, and may closely coordinate to achieve the superiority of group efficiency based on their specialization and collaboration. The competition widely exists in the cluster, but is more often an inter-enterprise collaborative relationship. It makes the individual enterprise not only maintaining sufficient initiative as well as the high vigilance and sensitivity to cope with the "survival of the fittest" competition in the market, but also collaborating with each other and achieving development together.

4) Embeddings

Local embeddings refers to the economic behavior deeply embedding the local social relations. Enterprises in the cluster usually have the same or similar social and cultural background and system environment, and further the common cluster language, background knowledge and trading rules are deeply embedded in the behaviors of the enterprise economic activity. Therefore the reliability and predictability of the enterprise economic activity can effectively prevent all kinds of opportunistic behaviors, reduce transaction costs, and promote the knowledge dissemination.
Liaoning industrial clusters’ development and issues

The industry cluster is an organization model of regional economy with higher competitiveness, mainly through promoting the derivation of enterprises, and organizing the key elements of resources within the region to the fullest extent to gain market advantage. At present, issues exist in the process of nurturing and developing the industry clusters in Liaoning province are as followings.

Firstly, technologically the equipment manufacturing industry is lack of core technologies. High-end equipment manufacturing is referred to as the “mother of industry”. The large equipment manufacturing in Liaoning is in a leading position on the domestic market, such as the Dalian Bay equipment manufacturing industry cluster, which includes well known enterprises such as the First Chinese Heavy Industry, the Dalian Shipbuilding Industry, Linde Engineering etc. Despite the debt crisis in Europe, the decline in the domestic market and other unfavorable factors, the Dalian high-end equipment manufacturing industry managed a profit of 9.5 billion Yuan from January to May in 2012, an increase of 28% compared with the same period of last year. However, compared with the United States, Germany and other developed countries, the backbone of Liaoning’s equipment manufacturing lacks independent technical reserves and its innovation capability is not strong enough, key components and raw materials rely on foreign imports, the industry cluster as a whole is locked in the low-end or middle of the global value chain. For example, the FAW-Volkswagen Engine (Dalian) Co., Ltd. had imported some casting parts from Germany for a long time. Germany then discontinued the production of this component, but transferred the technology to Brazil. And now this company imports the parts from Brazil.

Secondly, the degree of industrial clusters association is weak, resulted in the lack of poor synergies. Some enterprises are just clustered in the industry area spatially, and they lack of correlation, mutual supporting and synergies. Especially in some “new industrial areas”, companies moved in because of the policy incentives, and the coordination between enterprises is not strong, and the information doesn’t flow smoothly among them, thus they are stuck in a group without the cluster benefit. For an example, in the Huanyuankou Economic Zone, enterprises of the new materials industry clusters introduced into the area (such as the Lichang New Materials Co., Ltd., Huake New Materials Co., Ltd., etc.) simply moved in their manufacturing sectors. The lack of talent greatly limits the formation of new materials innovation network, there’s no regular technical exchanges between enterprises, and the collaborative technology innovation is poor, thus the efficiency of the cluster has been significantly reduced.

Thirdly, from the ecological and sustainable point of view, there’s a tendency of waste of resources and environmental pollution. Excessive land resources exploitation plays an important role affecting the sustainable development of regional industrial clusters. After several years of development and construction, Changxing Island established four leading industrial clusters of petrochemical, shipbuilding and marine engineering, equipment manufacturing, port logistics. But the enterprises moved in earlier over occupied the land, resulting in land shortage for subsequent competitive enterprises coming in. The region's planned land-use target is 51 square kilometers, with 36 square kilometers occupied; the remaining usable land is only 15 square kilometers. The development of industrial clusters also brings some pressure on the environment. According to “Dalian Environmental Bulletin”, in 2011 the SO2 emission from Dalian reached 146,000 tons (94,700 tons in 2009), and the city's industrial solid wastes production is 5.4251 million tons (3.77 million tons in 2009). "The National Environmental Bulletin" indicated that “in 2010 that the water quality of Gulf Bohai is poor and moderately polluted”.

Strategies of developing industrial clusters

Industry cluster is essentially the best way of effectively organizing a variety of essential resources elements, and it’s a way to allocate resources to allow a competitive advantage in economic activities. The cultivation and development of industrial clusters involves not only the regional function identification, industrial classification and ecological environment, but also the level of science and technology, market prospects, consumption patterns and many other factors.
Implementation of the "innovation-driven" strategy

Technological innovation is the most critical factor for a country's economic development; this is a consensus both for policy makers and for academia. Therefore technological innovation should be placed in the central position of the industrial development and growth. The development model of the manufacturing industry in developed countries is "pilot innovation - production - exports -imports - more innovation", occupying the high-end of the value chain. Liaoning equipment manufacturing cluster is stepping into a high-growth stage, the goal should be to continuously improve competitive core products on the domestic and international markets, strive to improve the capability of independent innovation as a development priority; maximize the supporting and leading role of the scientific and technological progress in the province's industrial structure optimization and upgrade; increase government financial support, focusing on supporting core enterprise technological innovation and joint research on critical issues in several new national exemplary industrialization bases, and getting rid of the import dependency of critical components and some raw materials; cultivate a batch of leading enterprises and enterprise groups which are influential internationally and competitive domestically with independent intellectual property rights, and strive to occupy the most high end of the industrial chain.

Cultivate new industries, and develop emerging markets

"The twelfth Five-Year National Strategic Development Plan for Emerging Industries" clearly puts forward the seven strategic emerging industries of energy-saving and environmental conservation, new generation of information technology and high-end equipment manufacturing etc. Among the above-mentioned eight national exemplary bases in Liaoning Province, the high-end equipment manufacturing industry, electronic information industry and information software industry in Shenyang and Dalian are all national strategic emerging industries. Thus, Liaoning Province should seize the opportunity to accelerate the cultivation and enhancement of the strategic emerging industry clusters on the existing basis, and to achieve structural changes of industrial clusters.

Industries driven by the “leading consumer demand” will be the forefront of development, and will have a "first-strike" advantage on the market. In addition to the traditional shipping, marine fisheries, the Liaoning coastal economic zone should, based upon the coastal advantages, nurture the high-end marine industries which lead the consumer demand and meet the emerging market. For example, the planned construction of “the Yacht Industrial Park” on Changxing Island is the high-end tourism which leads the development of tourist market, which will be built as a world-class yacht production base and business resort island in early 2020.

Strive to improve the industrial chain to address the issue of lack of downstream products

A complete localized industry chain will not only reduce the procurement and supply costs, more importantly, it is beneficial to the knowledge association between the upstream and downstream enterprises and technological innovation. Improvements should be made in accordance with the idea of "big project - industry chain - cluster - industrial base", to the improve system of various stages of the industrial chain. The most prominent problem of the industry chain of Shenyang equipment manufacturing cluster is "strong on both ends and weak in the middle", which causes unstable factors for the sustainable development of the equipment manufacturing industry. Therefore, to extend and improve the industrial chain of the Shenyang equipment manufacturing industry cluster, nurturing and supporting the midfield-node enterprises which are capable of carrying on research and development on, and manufacturing critical, high-performance parts and components are of the key importance. The petrochemical industry in the Dalian Jinzhou New Area is at the middle and upstream of the industrial chain, and lacks downstream products. But in recent years, with the Dalian West Pacific as the leading enterprise, a cluster of the petrochemical industry has formed gradually.
A number of newly established petrochemical projects, such as Japan's Sumitomo Chemical, Zhejiang Yisheng Grand Plaza etc., have driven the industry further downstream, extending towards synthetic fiber-based fine chemicals. This changes the situation that the Dalian petrochemical industry has "oil head", but doesn't have "chemical tail". The Dalian petrochemical cluster should strive to form a complete industrial integrated chain of "oil as head – petro-chemical as the body – plastics as the tail", to greatly enhance the added-value of an industrial cluster.

Promoting ecological industrial clusters

Frosch and Gallopoulos (1989) put forward the concept of "industrial ecosystems", and pointed out that the industrial system can simulate the ecosystem, which flows from producers to consumers and recycles by decomposers, to establish a co-existing relationship among enterprises based upon material and energy recycling, i.e. to achieve resource sharing, waste stream concentration and exchange of materials and energy; which is also a recycling-based industrial system of “optimal production, optimal consumption and minimum waste", i.e. "eco-type" development model of industrial clusters. Eco-type transformation is increasingly becoming the basis of long-term competitive advantages of the industrial clusters.

Promote the cell engineering of cleaning production

Enterprises are the main micro entities of regional ecology, and they are the cells for resource conservation, energy saving and emission reduction. At the beginning of project planning and construction, it should be scientific planning and arrangement, intensive land use, avoiding the phenomenon of "land enclosure". In the process of industrial development, enterprises are encouraged to conserve resources, and to promote waste recycling, clean technology, etc. In 2009 the engineers of the Intel chip plant in Dalian used innovative design for the water treatment systems, recycling and reusing the rinse water of the production process. The annual savings of this innovation alone is 26 million tons of city tap water.

Construct "industrial-chain" by "food chain"

Based upon the theory of improving the industry eco-efficiency and recycling, the investments are selected and matched according to the "food chain" of existing industrial clusters to construct eco-type ones. The STX Group contracted with the Changxing Island Harbor Industrial Zone, investing in the shipbuilding industrial base in September 2006. Soon after, more than a dozen industry chain enterprises followed successively. The Puxiang (Changxing Island) Ltd. project was completed in June 2011, to provide raw materials for shipbuilding, in April 2012, the joint venture of the Dalian Shipbuilding Industry and the Angang Steel Inc. for ship repairing went into production in the industrial park, while the green ship recycling project started construction as well. Scrap metals from shipbreaking may be recycled to the steel mills to be refined into new steel, which is used for new ship construction and maintenance. The "food chain" clusters have promoted the recycling of raw materials and waste.

Reference


Acknowledgment

This work was sponsored by Liaoning economic & social developing program (2013lslkxzijjx-16), Dalian Jinzhou softscience planning program (2012-D1-003), and research funds for the central universities (ZJ12RWB013)