

# Exploration of the Ecological Economy of Industrial Clusters in Jiangxi

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**Abstract.** To explore the ecological economy of industrial clusters in Jiangxi, based on the research and analysis of the industrial cluster of Poyang Lake ecological economic zone in Jiangxi province, the strengths and weaknesses of Poyang Lake's ecological cluster and its opportunities and challenges were analysed through SWTO analysis. Through the study, the orientation of the Poyang Lake ecological industrial cluster in the process of development could be found, the opportunity in the process of development could be taken advantage and the short board could be made up at the same time. Moreover, after the comprehensive analysis of practical experience in the process of domestic and foreign ecological industrial clusters, the in-depth study of the actual situation of Poyang Lake ecological economic clusters in Jiangxi Province was made. The results showed that the ecological economic clusters needed to be improved to a certain degree. As a result, some suggestions are proposed for the industrial cluster in the economic zone. On the basis of vigorously promoting ecological philosophy and strengthening the basic infrastructure and so on, it is necessary to create qualified plant and animal products and then process the clusters, establish ecological animal husbandry, sustainably utilize local resources to develop aquatic animal and plant industry, and construct ecological economy and industrial value chain.

## 1. Introduction

With the continuous development of the economy, the ecological environment, energy resources and other problems are becoming more and more prominent. How to maintain the ecological stability, improve the utilization of resources, and make people and nature develop harmoniously is the requirement of sustainable development. The state is also energetically constructing a resource-saving and environment-friendly society. All these provide opportunities for the ecological industrial cluster in Jiangxi province.

There are two sides to the development of things, and the industrial clusters are no exception. On the one hand, the external economy with several clusters of industries can promote the competitive advantage of the industrial cluster. On the other hand, the backward production mode at the present stage and the large number of industrial clusters will lead to environmental problems. The ecological resources are public resources, and the non-exclusive and non-competitive features of ecological environment easily lead to "free rider" behaviour. As a result, it easily leads to excessive waste



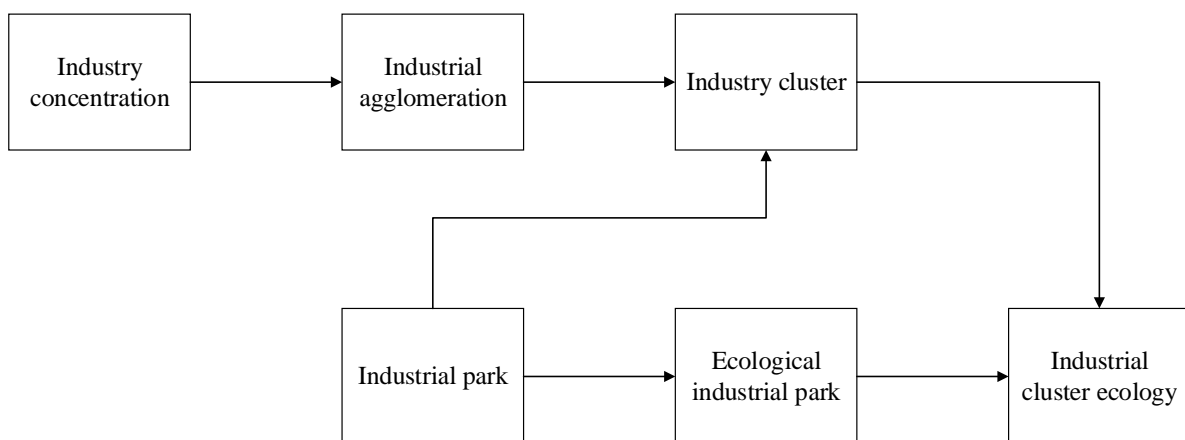
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discharge of enterprises. It ultimately exceeds the environmental capacity, and pollutes the ecological environment, and the Taiwan Hsinchu Industrial Park is a typical representative.

Therefore, the ecological transformation of industrial clusters must be started immediately. The study suggests that the development of industrial cluster to ecological environment can well protect the ecological environment, make efficient use of ecological resources, effectively avoid environmental pollution, and discard the idea of pollution before harnessing in the past. The ecological industrial cluster refers to the collection in space. It discovers and establishes the internal links among enterprises in the cluster to establish industrial chain network, which should include supply chain, production chain, value chain and sales chain. We are supposed to transform the old "resource - product - waste" industrial cycle into "resource - product - renewable resources", change the existing environment externalization, and fundamentally eliminate the pollution.

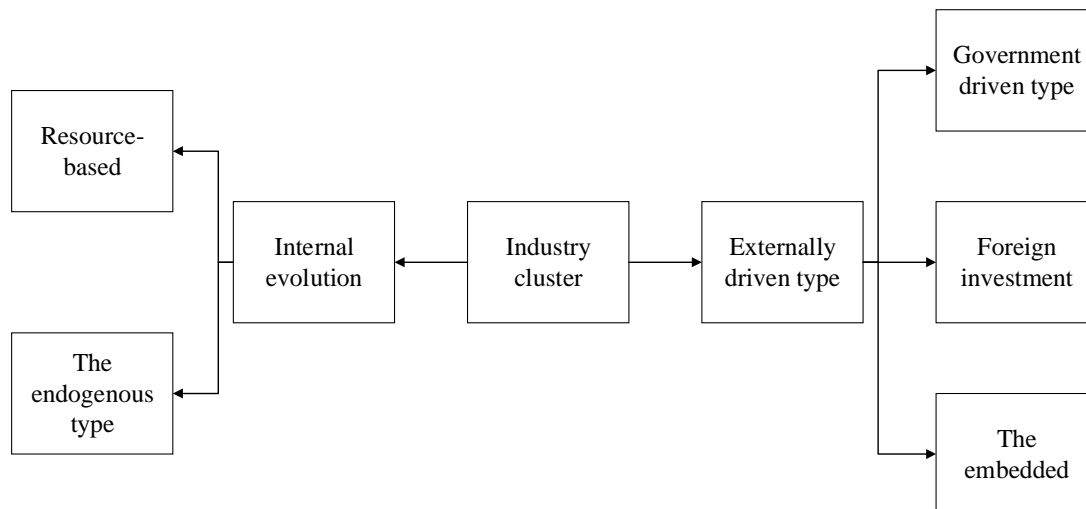
## 2. Background introduction

The industrial cluster at the present stage is still a no consensus concept, but there are a few points of connotation of industrial cluster have been recognized by most researchers. They mainly include: firstly, the correlation and assistance between the different division enterprises is the cornerstone consisting of a cluster; secondly, in terms of spatial structure, the relevant enterprises get clustered in a certain geographical region; thirdly, these related enterprises, through long-term cooperation, have acquired the relation network that mutually trust and mutually coordinate, which is the essential characteristics of industrial clusters; fourth, the industrial cluster has a good external scope economy and external scale economy, which can well reduce the transaction cost. In addition, through the mobilization of knowledge theory, information and technology, we can further strengthen the innovation of the enterprises in cluster.



**Figure 1.** Ecological evolution of industrial clusters

Industrial clusters can be divided into two types: internal force evolution type and external force driving type. The internal evolution type includes resource type (traditional type) and endogenous type (local type); externally driven type (industrial park type) includes embedded type, foreign capital pulling type and government driven type, as shown in Figure 2.



**Figure 2.** Types of industrial clusters

The study of ecological industrial clusters is based on the theory of "industrial metabolism", and the research abroad is mainly focused on the industrial ecology. Danish researchers published the book "Industrial Symbiosis" in the last century. From the perspective of industrial symbiosis, the book elaborated the industrial ecology, focusing on the cooperation between enterprises through by-products. Matthias, Paolo Dell and Anno, in 1997, through the empirical analysis of the industrial ecology, realized the industry ecologicalization. They built the "material and energy cycle" of the "multi-layer" industry by modelling, making the maximum use of materials and energy. The study of Seager and Theis showed that life cycle assessment and system analysis could play a great role in the study of industrial ecology.

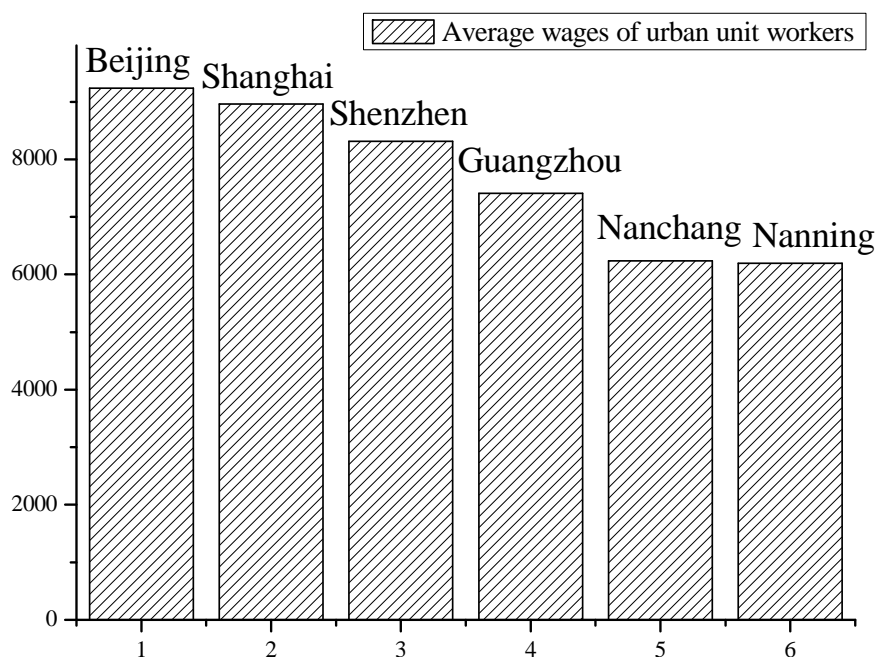
In order to build a sustainable and environmentally friendly society for development, China's research mainly focuses on the direction of ecological industrial clusters. The ecological chain between industries is excavated through the spatial organizational structure of industrial clusters, and the waste products are regenerated into available resources. Ecological economics and circular economics are the main research directions of Chinese scholars and with the development of the research, these two directions are combined.

Cao Lijun discussed the causes of industrial clusters from the angle of ecology. He believed that industrial clusters must be clear and optimize their "niche", so as to maintain the sustainable development. And he thought that the key to sustainable development was the coordination and management of enterprises in the cluster and the co-evolution of the external environment. Chen Liuqin believed that the industry cluster, integration and industrial ecology was to adapt to the development of modern high efficiency industrial organization form. He held that industrial cluster was the spatial organization form, integration was the integration of mutual penetration of the industry organization, and ecological industry was the organizational form of enterprises continuing the cycle.

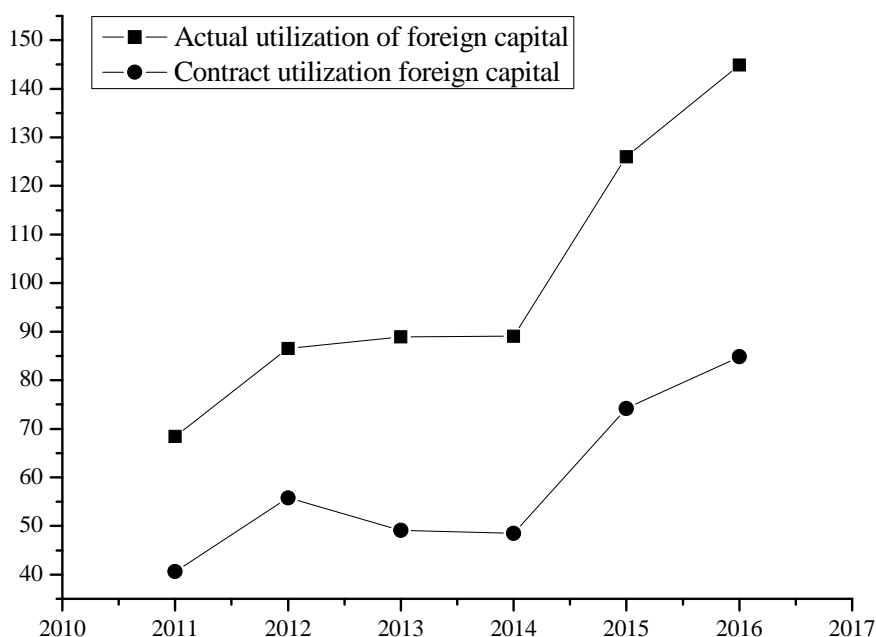
### 3. SWOT analysis of industrial cluster ecologicalization in Poyang Lake ecological economic zone

**Advantages:** Poyang Lake is the largest freshwater lake in China, which has good geographical conditions. It is located at the intersection area with rapid development and active economy, which makes the ecological economic zone of Poyang Lake region have richly endowed region, human resources and industrial chain advantages. As a result, it has a very good role in promoting the competitiveness of industrial clusters. The per capita GDP of the Poyang Lake ecological economic zone is 1.57 times that of the other regions in Jiangxi province. Poyang Lake has excellent ecological environment conditions, and the construction of Poyang Lake ecological economic zone is rapidly developed in the strategic opportunity of national development. The rise of rural tourism, spa tourism,

forest tourism and ecological tourism makes tourism industry cluster formation, with Poyang Lake as the centre, basically formed. Poyang Lake is rich in mineral resources, and because of its abundant surface water resources and sufficient arable land, it can grow food crops and cash crops. The Poyang Lake basin is rich in labour resources. Raw materials prices are low, prices of yellow sand, cement and other building materials are far lower than those of coastal areas and the price of land, water and electricity is only less than half of that of other provinces.



**Figure 3.** Average wage table for employers in urban units in 2016

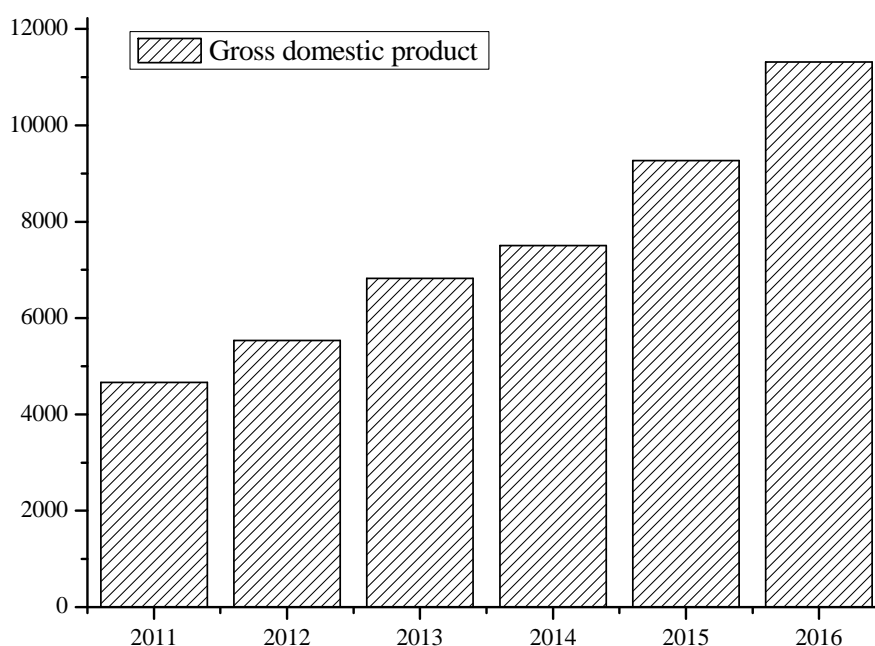


**Figure 4.** Utilization of foreign capital in Jiangxi province in the past 2011-2016 years

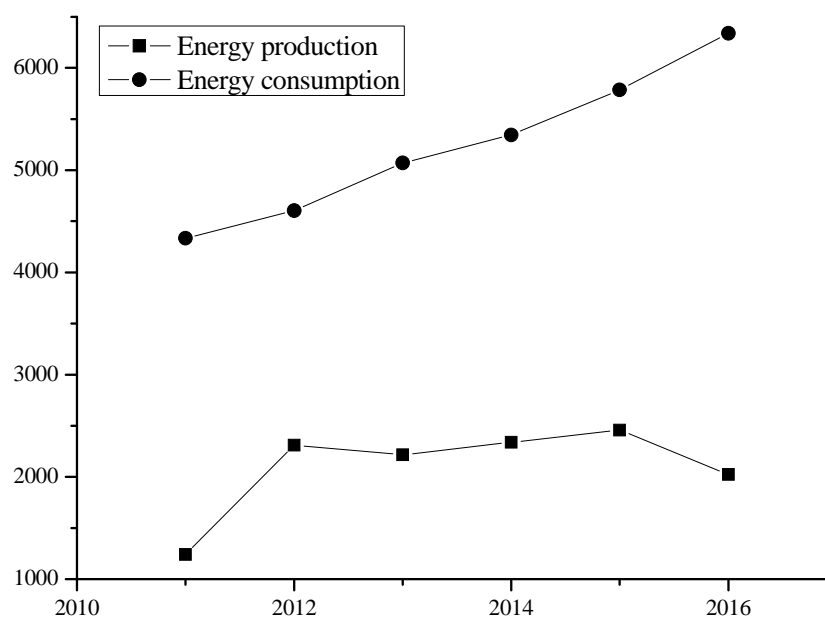
**Disadvantages:** the infrastructure of the industrial park is not perfect, which makes no long-term and effective cooperation mechanism between the research and development institutions and the enterprises outside the park. The development of infrastructure around Poyang Lake is not sound and the traffic is not convenient in this area, which restricts the industrial cluster and the ecological development. Because the development of high speed highway network and railway network needs to be improved, logistics development is lagging behind. Moreover, the financial industry is not developed, and the capital gap is large. The development of the financial industry of the existing funds is lagging behind, the financial resources are scarce, and there is also an irrational phenomenon in the existing fund allocation. Nowadays, most of the industries in the park are in the initial stage of formation, which cannot be associated. The park industry is mainly driven by the government, and the market has not played a good role. The division of labour between the parks is not clear, there is no mutual recognition, the synergy mechanism is bad, and there is no symbiosis network between the upstream and downstream industries. This makes the enterprises in their own array and the transaction cost high, which makes the competitiveness less and lack of innovation, and does not really achieve the "cluster" effect of industrial clusters.

**Opportunities:** Chinese economy remains steady growth stage of economic development, and now begins to shift to the high quality, and this is the good opportunity of the ecology of industrial cluster. At the same time, the coastal areas and the developed provinces are gradually carrying out a new round of industrial upgrading, and a large number of industries transfer to the Midwest. If Poyang Lake industrial park can undertake large-scale industrial transfer, the production technology upgrade can be conducted by using the undertaking industry. As a result, the enterprises expand the business, introduce external funding, and introduce talent knowledge and product foreign trade channels and other aspects, which have brought new opportunities for the ecological development of industrial clusters in Jiangxi.

The gap between resources and energy supply and demand in Jiangxi is large. Raw materials and energy supply are hard to meet the needs of industrial development. The carrying capacity of resources and ecological environment is near the limit. The economic operation of the Poyang Lake river basin is good, and the per capita GDP has entered the high-speed development stage of 3000 US dollars. The strong economic foundation has ensured the ecological development of industrial clusters.



**Figure 5.** Total growth in Jiangxi (10000 yuan) in 2010-2016 years



**Figure 6.** Energy production and energy consumption in Jiangxi in 2010-2016

Threats: the brand operation ability in Jiangxi province is insufficient, which needs the support of the government. It is necessary to create a brand leading enterprise as soon as possible, which is helpful for the ecological construction of industrial clusters. The production scale can be expanded by the brand output with kinetic energy. Moreover, we can establish cluster brand management system through policies, which can standardize product quality and regulate the interests among cluster enterprises well. At the same time, it can strengthen the reputation of the enterprise and establish the image of the enterprise.

The standard of all aspects of market economy in Poyang Lake area needs to be improved. Jiangxi's reform and opening up and economic development are always relatively backward. The planning of industrial parks is dominated by the government, and the internal relationship of industrial clusters cannot be fully realized. This is harmful to the development of the ecological industrial park. At present, the ecological industrial park is in urgent need of developing a set of unified scientific planning management systems and procedures, and improving the market mechanism to promote the development of ecological industrial parks at the same time.

#### 4. Results

According to the SWOT analysis in the previous part, we can find that Poyang Lake ecological development of industrial cluster has several advantages: favourable geographical location, excellent ecological environment, and rich resources in Jiangxi Province, with a large number of mineral resources and natural resources. If we can make full use of these advantages, seize the international, country and provincial development opportunities, and increase ecological intensity of industrial clusters, which can accelerate the leapfrog development of Jiangxi province.

At the same time, we cannot ignore the existing problems in the industrial cluster of Poyang Lake. To solve these problems, we should actively promote the establishment of long-term cooperation mechanisms among cluster enterprises; focus on improving public services; and promote industrial transformation to professional, strengthen industrial connection and enhance the comprehensive competitiveness of the development process of ecological industry cluster. In the meanwhile, we should promote foreign enterprises to settle down and faster integrate into the local enterprise cooperation, and form a symbiotic network. In this way, we can reduce the transaction costs among

enterprises, and make full use of the original resource advantages and the advantages of the low labour cost.

## 5. Conclusion

Industrial cluster is building enterprise network and entrepreneur network in a certain space area. It is indispensable to concentrate on the human, physical and financial resources in the enterprise. At the same time, we should focus on introducing high and new technology industry to promote the innovation power of industrial cluster. Industrial clusters can be divided into supply chain, production chain, sales chain and value chain according to the dimension. The industrial cluster's industrial chain is unable to run well without the support of the technology chain, the knowledge chain and the information chain.

It is believed that the ecological development of the industrial cluster in Poyang Lake ecological economic zone can be divided into two stages. In the early stage, the development of the ecological industrial park is emphasized. This is a prerequisite for production and gathering. It can initially form industrial clusters, then establish and develop core industries, actively develop matched industries and supporting industries on this basis, and improve the inherent symbiotic industrial chain network of clusters.

## Acknowledgments

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## References

- [1] Ge X, Han Q L, Zhang X M. Achieving Cluster Formation of Multi-Agent Systems under Aperiodic Sampling and Communication Delays [J]. IEEE Transactions on Industrial Electronics, 2017, PP (99): 1 - 1.
- [2] Panda S, Nagendra S M S. Assimilative Capacity Based Emissions Load Management In A Critically Polluted Industrial Cluster [J]. Journal of the Air & Waste Management Association, 2017 (6).
- [3] Daddi T, Nucci B, Iraldo F. Using Life Cycle Assessment (LCA) to measure the environmental benefits of industrial symbiosis in an industrial cluster of SMEs [J]. Journal of Cleaner Production, 2017, 147.
- [4] Chintalapudi P, Pujari P, Khadse G, et al. Groundwater quality assessment in emerging industrial cluster of alluvial aquifer near Jaipur, India [J]. Environmental Earth Sciences, 2017, 76 (1): 8.
- [5] Liu L, Wang J, Song H, et al. Synthesis of water networks for industrial parks considering inter-plant allocation [J]. Computers & Chemical Engineering, 2016, 91: 307 - 317.
- [6] Lian H H, Dong C, Wang Q, et al. Cluster-plus-glue-atom model of FCC solid solutions and composition explanation of typical industrial alloys [J]. Acta Physica Sinica, 2016, 65 (3).