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On Development Model based on Intra-county Cyclic Economy under Low-carbon Economy for Northeast China

Guo Zhen^{*}, Liu Qieyi, Wang Xiaoxu*School of economics Harbin University of Commerce, China, 150028*

Abstract

Northeast China as the old industrial base is still under the development stage of resource-consuming. In order to rejuvenate northeast China, it is necessary to actively accelerate the transformation of economic growth mode. The development mode of intra-county cyclic economy under low-carbon economy should be strived to develop. Based experiences on development of intra-county economy, the scientific and effective low-carbon innovative system were established. Therefore, there will be a new model of development based on intra-county cyclic economy.

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Keywords: low-carbon economy; circular economy; intra-county cyclic economy; low-carbon innovative system of intra-county

1. Introduction

Addressing Climate Change, transition to a low carbon economy is a new trend for the world's city and county economic development. We should reproduce and reuse rubbish, emissions and waste solid in order to meet the development of low carbon economy. The reproduction of resources is the circular economy. In order to revitalize the northeast old industrial base and speed up the process of urbanization, we should actively promote the intra-county cyclic economy for minimizing the resources (especially coal, oil, natural gas) development and consumption, and reducing carbon emissions, ultimately achieving the sustainable socio-economic development.

1.1. The relationship between low-carbon economy and cyclic economy

^{*} Guo Zhen. Tel.: 13 115552163; fax: 84865167.

E-mail address: guozhenhrb@sina.com.

Cyclic economy is a short title for close-loop flow of material-based economy. It demands that economic activities should be a feedback process of "resource-product-renewable resource". Its features are low-exploration, high-utility and low-emission. So the basic target of low-carbon is the same as which advocates the economic development mode for harmony between human and environment, with high-efficiency and cyclic utility as the core, low-consumption, low omission and high-efficiency as the characteristics. Ecological industrial chain is a vehicle for development, with clean production as the important way, which in order to achieve the effective use of material resource and sustainable development of ecology with its feature of low-exploration, high-utility and low-emission. Essentially, low-carbon is cyclic-carbon economy. It can be seen as the selected mode for regional economic development of low-carbon which requires the ecological regular to guide the economic activities in human society. As production activities, it is under the thought of sustainable development, following the way of clean production, making use of energy, raw material, all kinds of material trash in cycling development mode.

1.2. The significance for the development of low-carbon economy in Northeast China

Nowadays, China's northeast region are facing a tough challenge in engaging in persisting in the resource-saving and environment-friendly society as a way of high speed development. As we all know, northeast area are the main resource supplier in China's old industry, and coal is the main part in the energy structure which is a long-term limited factor for transformation of low-carbon development mode. Although northeast area develops chemical industry of coal and clean-utility technologies for coal which are still not enough for the demand for coal in the energy structure. Additionally, the limitation of chemical industry and clean technology for coal makes it hard to promote the transformation of energy structure. Obviously, northeast is on the resource consumption stage, and extensive economic development mode lead to the characteristics of high consumption, high pollution, high omission in big cities and intra-county industry. Now, the export products in China's northeast part is high-energy, high-carbon and low-fringe value which means carbon omission will pay for more and more economic costs and social costs in the future system which means the low-cost advantage of products will disappear gradually and influence the status and competition of northeast areas in the global industrial chain. So holding the target of low-carbon development, changing energy structure, promoting the economy especially the cyclic economy in intra-county has become urgent problems which need to be solved.

1.3. Experiences in intra-county cyclic economy

Kalundborg ecological industrial zone of Denmark was established in 1982, which was the world typical representative as a kind of cyclic economic mode which targeted the industrial chain. This mode refers to the cycling material among the ones that possess industrial ecology chain with relevant industrial department. The cooperation in this zone includes plaster plant, power plant, refinery plant, insulin and industrial enzymes. And the cooperation projects include the recycling for water, the resource transformation, the recycling of discarded products and so on.

German dual recycling system is the cyclic mode that bases on the social reproduction in ICI, which form "natural resource-product-comprehensive utility of renewable resources". It not only involves the production link, but also the circulation, exchange, consumption, recycling and reproduction. German DSD dual recycling system is a special non-government organization which deals with the recycling of package discarded. It is composed of production plant, package plant, commercial enterprise and trash cycling department. It accepts the enterprise orders, and handles with the classification of trash, then sends to the certain plant for recycling resource.

2. A system for intra-county cyclic development

In order to improve the development model of intra-county cyclic economy for Northeast China, and promote the sustainable economic development in Northeast China, low-carbon innovation system of intra-county cyclic economy should be built reasonably. Low-carbon innovation system includes low carbon knowledge innovation system and low carbon technology innovation system.

2.1. Low-carbon knowledge production

Low-carbon knowledge production system of intra-county cyclic system is a network composed of low-carbon knowledge production, distribution and shift on related administration and organization, and it's mainly about low-carbon knowledge production system, low-carbon knowledge distribution system, and low-carbon knowledge management system. The core of low-carbon knowledge production system is the research agency and university, which includes senior educational institute, enterprise research institute, government department, supportive equipment and so on. Low-carbon knowledge distribution system mainly points to senior educational system and professional train system with the aim to foster and store low-carbon production technical personnel. Low-carbon knowledge management system play an important part in promoting the good development direction of low-carbon environmental policy, and regulating the market behaviours and digging in the potentials of low-carbon innovative resource and so on.

2.2. Low-carbon technological innovation

Low-carbon technological innovation system makes the low-carbon technological innovation as a lead. And it's the core composed part of intra-county low-carbon technological innovation system, which mainly involves the low-carbon innovation main body, methods, organized mode, and the way to achieve value and so on. Low-carbon technology involves every industrial sector of economic society, such as the effective new technology to control greenhouse in some fields of iron, chemistry, petrochemical, electricity, transportation, construction and the efficient use of renewable and clean coal, oil gas and coal resource explored, carbon captured and buried. In addition, cyclic economy is also thought as a kind of concrete economic mode of low-carbon economy in which way the construction of Low-carbon knowledge production system can provide guarantee for the intra-economic development.

3. Counter measures of intra-county cyclic economic development

3.1. Agriculture cyclic economy system

The ecological industrial chain mode of agriculture cyclic economy in northeast intra-county is based on the construction on ecological industrial zone. Under the principle for "3R" of cyclic economy and standard for "recycling, reduction, resources", they are combined with the local resource features, industrial structure, and at the same time develop special cyclic and organic agriculture, and transform the agriculture production mode with the petroleum chemistry as main factor, eventually realize the low-carbon of intra-county agriculture economy in northeast region. Agriculture ecological industrial chain assures the clean production way, and at same time makes full use of agriculture trash and optimizes the proceed of "natural resource-produce-trash-renewable", then realizes the best use of material and energy in the constant cycling process. Agriculture ecological industrial chain includes every subunit of ecological planting, forestry, fisheries, livestock, and through the trash exchange and cyclic use of these

subunits to eliminate the damage to environment and add the value to ecology. Through the accuracy and resources in agriculture production (American accurate agriculture and German green energy agriculture) and construction on ecological industrial chain as following, both stretch on length and width in industry and service industry that can eventually form the ecological industrial network structure. Firstly, the ecological industrial chain mode of agriculture cyclic economy is made as a focus on the future agriculture industrial development in northeast areas, via the construction and stretch on ecological industrial chain, and enlarge the field of combination of ecological industry and cyclic economy, and optimize the agriculture industrial structure from the angle of "clean development system", then connect ecological industry with cyclic economy which eventually reach the rely on ecological industrial chain in order to stimulate development of northeast agriculture cyclic economy. As a result, we can supply foundation and security for intra-county industry, after which service and agriculture to coexist in the cyclic economic development mode.

3.2. Industry linkage with the basis on innovative system

Northeast region as China's old industrial base, their developed capacity mainly centralize in big cities, and its industrial manufacturer mostly reflects in two high indexes which are high-consumption and high-carbon. Northeast intra-county industrial development falls far behind oceanic developed cities. The traditional way isn't suitable to promote the industrial level any longer which means persistence in the low-carbon cyclic economy is the right choice. The way of making the cyclic economic mode of northeast intra-county industry is to set up the production innovative system as the foundation and follow the method of industry linkage cyclic economic development. First, there are three concrete modes of construction on production innovative system, such as independent innovation, imitated innovation and collaborated innovation. The combination of the three methods can push the reasonable integration of every factor and resource in low-carbon production technological innovative system. The use of new low-carbon production technology should fulfil the basic principle in the cyclic economy, then promote the advantage of the production technology and the low cost and high added value via taking share of international market and large amount of consumer which help transform the low-carbon technology to a competitive advantage, and eventually bring big profits to the enterprises with low-carbon innovative technology. Second, with the construction on ecological industrial zone as the core, accompanied with the clean energy developed system, extra-heat collected and water cycling system, trash deposit and gas omission system as the industrial organized system frame of county industrial cyclic development mode, establish other assistant enterprise which are relevant to the core enterprise of ecological industrial zone. In other words, there is a need to strengthen the connection among industries, and increase the intense relationship in order to accomplish the organic complementary between resource and energy, then promote all kinds of liquid, gas, solid trash cycling, eliminating the emission of pollution after which we can found a closed county industrial economic development system to promote the rapid establishment of industrial ecological chain and at last come to the modernized ecological industrial zone with the energy coexisted and material cycling as a platform.

3.3. Ecological model of producer services cluster

The northeast county economic development cannot be apart from the coordinative development of agriculture, industry and service. As a result, we should develop low-carbon service industry which rely on the agriculture and industrial cyclic economy, and actively interact with agriculture and industry in order to promote the sustainable development in northeast county cyclic development. Learning from the industry and agriculture development, with the aim of interaction, we should choose the cluster ecological

cyclic economic development mode of production service. The cluster of production service industry bases on the specialization and social coordination and the big, middle, small level of production service industry existing together, and different types of enterprises form coexisted and complementary ecological group. This kind of corporate group is through the imitation on ecology that form the up and down stream of close "food chain" and food chain, then timely full information about market demand and technology research can be provided for personal innovative development, and we can grasp the accurate market development after which we can provide production service with personality, formulation, systematization that can make us more competitive in the market. The production service industry cluster takes on the ecological development mode that gives most service industry more space to develop through both independent development in the administration and the intense connection and supplementary among certain industry. The production service industry cluster breaks through the limitation of traditional production service industry cluster and integrate the production service, consumption service, society service and environment service together, and highlight the subject of harmonious development between human being and nature that effectively push the low-carbon development of the primary, secondary and tertiary industry, then promote the sustainable development in northeast county cyclic economy.

4. Conclusion

Northeast county economy is the important basis for the whole regional economy in northeast China, we should vigorously develop intra-county economies in order to revitalize the northeast old industrial base. Therefore, the choice of northeast economic development model has become the most pressing issues for the northeast old industrial base, with focusing on the essential relationship between circular economy and low-carbon economy, fully integrating characteristics of northeast county economic, we can finally explore a new recycling economy development model covering three major industries of northeast China on the theoretical basis of low-carbon economy.

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