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A Review of the Studies on the Development of China's Resource-Based Cities

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Abstract

The development path of resource-based cities is different from that of any other cities, for the particularity of natural endowment determines industries' various reliance on resources. After a close look at the literature relevant to the studies on the development path of resource-based cities both at home and abroad, this article has obtained the following major findings. First of all, some Chinese researchers have engaged in the study on the sustainable development of resource-based cities. This line of research mainly focuses on society, economy, resources and environment and chooses related indexes as the evaluative standards, while regardless of the unique attribute of the resource-based cities. The second finding is that many studies on the development of resource-based cities centered on the macro development of the cities, but paid little heed to the mechanism concerning the transformation of the resource-based cities. The next finding is with regard to the research methods. Generally speaking, descriptive and qualitative research methods dominated the whole body of literature in this field, while quantitative studies could be hardly seen. What has also been found is that research in this domain is of a uni-dimensional flavor, centering mainly on the economic factors and ignoring the social and ecological perspectives. In the last part of this article, we propose that future studies should put more emphasis on the sustainable development of the resource-based cities and adopt a wide range of research methods such as a mixture of qualitative and quantitative methods, ecology-oriented methods, comprehensive evaluation method of index system and the theory of dissipative structure, with an aim to enrich and diversify the study methods in this line of research and to evaluate and guide the sustainable development of the resource-based cities in a more systematic manner.

Key words: Transformation and development; Resource-exhausted cities; Sustainability

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1. CURRENT SITUATION OF THE DEVELOPMENT OF THE RESOURCE-BASED CITIES IN CHINA

The theoretical study of the development and transformation of the resource-based cities is of great significance. Since the 1950s, with the progress and advancement of China's modern industrialization, a number of resource-based cities have incessantly emerged, which are characterized by their reliance on resources endowment and the exploitation and processing of mineral resources. The development of the resource-based cities has its deserving historical significance in that it has provided a proliferation of fossil energy and mineral raw materials for the grandiose cause of China's socialist modernization and has created a large number of employment opportunities for the society. By 2010, a total of 118 resource-based cities with a population of 154 million had been built and they accounted for about 18% of the total number of cities in China. The industrial system of most of the resource-based cites was commonly dominated by the resource processing industry which consumed a large quantity of resources and produced much pollution. Since the mid 1980s, resources exploitation in China's resource-based cites

has experienced its maturity and then a sharp decline in the pace of development due to the fact that the resources are limited and non-renewable (Xu & Wang, 2009; Liu & Que, 2009). The increasing reduction of the resource reserves and the gradual decline in the advantages of mineral resources plunged the resource-based cities into a difficult economic situation as the resource industry is their pillar sector. At the same time, a series of regional and structural problems arose gradually. For example, the ecological environment in the mining areas was deteriorated. Moreover, as the economy slowed down, there was a greater unemployment rate which accelerated the social conflicts. All those problems made the resource-based cities suffer a lot, instead of profiting adequately, from what had the potential to promote their greater development, namely the resource industry. The problems associated with the mining industry seriously hindered the sustainable development of resource-based city, as well as impeded the coordinated growth of the regional economy and the national economy. To realize the transformation of a high-carbon economy to a lower one, the priority must be given to accelerating the transformation of the resource-based cities, getting rid of the resource-exhausting dilemma, and subduing the influence exerted by the limited resources on the urban development.

2. LITERATURE REVIEW OF THE STUDIES ON RESOURCE-BASED CITIES IN CHINA

2.1 Studies on Relevant Policies

The government attached great importance to the development of the resource-based cities and resources industry. In 2001, the meeting concerning the transformation of resource-based cities was held in Fuxin, Liaoning province. At the meeting, Fuxin city was identified as the first resource-exhausted city nationwide and it was the first pilot city for the transformation. The tenth "five-year plan" clearly pointed out that the government should "actively yet prudently close the resources-exhausted mines, adjust the local conditions to promote the alternative industry in cities whose development is mainly reliant on resources exploitation and in large mining area, and be committed to the research and exploration of the new modes of mine development". In 2003, the state council of CCCPC (the Central Committee of the Communist Party of China) issued a document (document No. 11, 2003) which focused on the implementation of the strategies for rejuvenating the old industrial bases in northeast China and other areas. This document also pointed out that priority must be given to the transformation of resources-based cities in the old industrial bases. At the same time, it required the local authorities to formulate corresponding policies and strategies in support of the economic transformation of the resource-based city. The release of the 2003 document marked the beginning of the economic transformation of the mineral-rich cities.

In 2007, Premier Wen, in his government work report, clearly called for the promotion of the harmonious regional development and the support for the economic transformation of the resource-exhausted regions. In November of the same year, the state council of CCCPC issued another document (document No. 38, 2007) which also strongly supported the sustainable development of the resource-based cities and the resource-exhausted cities in particular and called for the establishment of a mechanism conducive to the sustainable development of resource-based cities. On September 9, 2009, the state council of CCCPC officially released a document (document No. 33, 2009). In this document, the state council called anew for the active promotion of the transformation of resource-based cities and put forward the strategies for the sustainable development of these cities. The 18th National Congress of the Communist Party of China also strongly promoted the ecological civilization, green development, circular development and low carbon development. During the sessions of NPC (the National People's Congress) and CPPCC (the Chinese People's Political Consultative Conference) in 2013, the transformation of resource-based cities again became one of the focuses. The serious problems facing the resource-based cities had been attached enough importance by the government. So, it is of great necessity for the scientific research personnel to deepen the study on the transformation of resource-based cities and on the development strategies, so as to provide theoretical basis and guidance for the industrial adjustment and sustainable development of resource-based cities. In April 2008, China defined 12 resource-exhausted cities as the pilot cities, 32 cities in March 2009 and 25 cities in November 2011 respectively. That is to say, the model of sustainable development was to be practiced in the pilot cities, most of which were dependent on nonrenewable resources and nearly 50% of which were coal-based. These pilot actions aimed to support and guide the smooth transformation of resource-exhausted cities so as to make them get rid of the resource exhaustion and to develop in a sustainable way.

2.2 Studies on the Industrial Economy of Resource-Based Cities

Since the mid 1980s, studies on the resource-based cities have gradually appeared, applying the theory related to the economic restructuring, the sustainable development and the theory of market segmentation (Randall & Ironside, 1996; Bradbury, 1985). These studies were conducted mainly because the old industrial areas suffered from resource depletion, structural decline, and the bankruptcy of the mining exploitation industry and losses of resource processing industry, which further led

to a series of problems such as unemployment, economic slowdown and social disorder. The domestic studies on industrial economy of the resource-based cities date back to the 1980s. The transformation of the old industrial bases facilitated the study on the resource-based cities. In 1978, Li (1978) published a paper entitled "*The Industrial Development and Urban Planning of Coal-Based Cities*", which touched upon the comprehensive development and industrial planning. Fan (1988) analyzed the general land plans for coal-rich regions and the focuses were on the relationship between the industrial structure and economic profits together with the potential problems. This study also figured out the corresponding problems in the industrial structure and the restructuring countermeasures (Fan, 1993). Moreover, a systematic analysis was carried out in the relationship between the economic development of the industry and the conditions of the mineral resources. The development strategies for the resource-based cities in east China were also come up with (Fan & Sun, 2004; Fan & Qian, 2004). Lei and Zhang (1990) proposed a compensation mechanism for the material, social and economic losses of the coal-based cities in the process of their development and suggested that the government should give physical, financial and policy support to the resource-based cities. The Urban and Rural Construction Committee of Tongchuan city presented the idea of building a brand-new model of coal-based city after analyzing the exploitation of the local resources and the local economic structure (Urban Construction Committee of Tongchuan City, 1997). Shen（1998) and Xu (1998) analyzed the developmental characteristics of the Chinese resource-based cities and various problems that these cities were faced with. They proposed five concepts for economic development, including alternative advantages, rebuilding advantages, complementary advantages, extending advantages and seeking new advantages. They also pointed out that the industrial restructuring is an imperative for the sustainable development of the mining cities. Besides the above studies, there are a number of case studies on the resource-based cities such as Datong (Shen & Cheng, 1998), Pingdingshan (Chen & Li, 2000), Fuxin (Chou & Tong, 2009) and so on. A majority of these studies employed a qualitative methodology, therefore, there is no tangible evidence in the appropriateness and rationality of these studies. With the passage of time, the scholars put more emphasis on the urban circular economic construction and the models of the industrial transformation than on the industrial structure of the resource-based cities. Xu and Liu (2008) studied the evaluation index system and methods of the circular economic development in resource-based cities and proposed a quantitative study method so as to build a circular economic system in a more reasonable way. Li (2009) took Zaozhuang and Yanzhou as the study subjects and analyzed the evolution of the two cities' industrial structure and provided some measures for the future development of the industrial structure. At the same time, this study pointed out that few studies had adopted a systematic and quantitative study method.

2.3 Studies About the Transformation of Resource-Based Cities

In the early 1930s, the Canadian famous geographers and economists Harold, A.Innis conducted a pioneering study on resource-based cities and towns in "*The Problem of Raw Materials Production in Canada*" (Li, 2009; Xu, 2007; Wang, 2010). And this paper, for the first time, expounded the impact of the resource production on the development of the local community and the problems which might be engendered. Late in the 20th century, many scholars conducted comprehensive research on the sustainable development of resource-based city. Their first focus was put on the economic transformation. In the foreign literature, the transformation of economic structure, commonly referred to as the economic revitalization of the regions suffering from a recession or faced with problems related to regional economic structure. Studies in this aspect are quite abundant and most of them are of empirical and qualitative nature (Hilson & Murck, 2000). Those studies involved the revitalization of Ruhr area in Germany (Kunzmann & Liu, 2009; Hans & Gernot, 2007; Tang, 2007), Kyushu area (Pan & Wang, 1995) and the like.

This line of research is relatively late. Since the 1990s, the industrial transformation of resource-based cities has been gradually paid due attention to. The studies in this field were conducted in empirical and comparative methods and usually from a macro perspective. These studies also emphasized the characteristics and existing problems of the mining cities in China by way of analyzing the successful experience of foreign countries and put forward suitable countermeasures for the industrial restructuring of the mining cities in China (Zhang & Wu, 2001; Zhang & Wu, 2001; Zhang & Kong, 2003; Qian, 2005).

The studies on the transformation of resource-based cities were mainly about the economic transformation, which was based on the requirement of urbanization in the transformation of industrial economy and the need of building a resource-conserving and environment-friendly society. And the major research contents ranged from the economic structure of the resource-based cities (Xu, 1998; Chen, Li & Ren, 2000; Zhang & Guo, 2006; Liu & Wu, 2007; Wang, 2008; Sun & Xiu, 2011), land use changing (Shi & Zeng, 2003; Du, 1998), the impact on the ecological environment (Shi & Zeng, 2003; Wang & Ju, 2003) and the sustainable development of the urban areas (Wan & Shen, 2005; Jiang, 2006; Jiao, 2001; Shen & Cheng, 1999). Before 2009, the academic studies mainly focused on the economic perspective. Since then, an increasing number of studies have touched

upon the social development (Su & Zhang, 2009) and the ecological environment of the resource-based cities (Zhang & Qiu, 2011; Wang & Lin, 2010). In terms of the research methods, early scholars mainly employed qualitative methods by reference to the foreign studies on the transformation of resource-based cities. For instance, Feng (2003) and Ren (2006) took in much from the study of the economic restructuring in Germany's Ruhr area (Mer Hermann & He, 2001; Li, 2002; Li & Hu, 2002; Guo & Zhu, 2004; Feng & Chen, 2006; Zhou, 2007; Ursula von Pitts & Zhang, 2007; Shen 1998) conducted a study on the economic development strategy of domestic resource-based cities. Gradually, some other research methods have been introduced such as the theory of dissipative structure (Huang & Hu, 2005; Tang & Zhang, 2008) and substance metabolism method (Zhang & Qiu, 2011).

In terms of the industrial transformation of resource-based cities, Xu and Zhao (2001) and Xu et al. (2004) proposed two development models of resource-based cities and established the optimization model of the industry structure concerning the sustainable development of the resource-based cities. Guo and Zhang (2004) summarized the development modes of the resource-based city at different developmental stages and put forward the method for studying the industrial pattern of resource-based cities. Li (2005) carried out a systematic analysis of the economic transformation and put forward new modes of and strategy for the economic transformation as well as the supporting framework for the economic transformation. Wang (2008) constructed a model which aimed to strike a balance between the internal structure of the industry in the mining cities and the sustainable development of urban economy. It further analyzed the structural upgrade of the economic factors in the mining cities, the industrial transformation, and the inherent mechanism to realize the sustainable economic development of the mining cities. Finally, it came up with constructive strategies for speeding up the urban industrial transformation and realizing the sustainable economic development of the mining cities.

In terms of the transformation strategies, Zhang and Wu (2001), Zhang (2001), Zhang and Kong (2003) analyzed the obstacles for the industrial transformation of the resource-based cities and the corresponding countermeasures and put forward three models of industrial transformation: the industry extension, industry update, and a composite model. Liu and Zhang (2011) evaluated the capability of the mining cities in the industrial transformation. Strategies for the industry adjustment were put forward by way of comprehensively analyzing the current situation of urban development from the perspectives of the economic factors, economic structure and mining industry. Fan and Gao (2004) held that the industrial transformation of non-ferrous-metal-rich cities should be one that is transformed from the exploitation and refining of the resources to the processing of the minerals. Xu et al. (2004) put forward the strategy for the sustainable transformation by summarizing the current difficulties facing the transformation of mining cities, such as the location, the mining industry, the environment, the system of the financial resources and qualified workers. Wu and Xu (2006), Huang and Hu (2005), based on the theory of dissipative structure, be carried on a rational analysis in the transformation of resource-based city and reviewed the present situation of industrial structure in the mining cities. Tian and Fan (2004) held that the general characteristics of coal-based cities in China determined the direction of the transformation, and that was to transform the cities into the comprehensive ones. The government should strengthen the links between the mining areas and the urban areas, develop the alternative industries, attract investment and engage in the environment governance and protection. All these were of strategic importance for the transformation of coal-based cities in China. This paper also discussed the development strategies of the mining industry after China's entry into the World Trade Organization (WTO). Except the above-mentioned studies (Fan & Yu, 2004), Wang (2010), Chen and Li (2010), Chen and Song (2011) and others also conducted relevant studies. With regard to the research methods of the transformation strategy, most of them adopted a qualitative analysis on the basis of experience, regardless of the regularity of urban development.

3. THE RESEARCH INADEQUACY AND FUTURE DIRECTIONS

As the transformation of China's resource-based cities has been actively promoted, there have been an increasing number of studies about the sustainable development of the resource-based cities. However, the fact is that these studies focused on the summary of existing transformation modes of resource-based cities and the discussion of economic development in individual cases. Although these studies have laid a solid foundation for the further exploration of the transformation of mining cities and for the establishment of the theoretical framework concerning the sustainable development, there is still a long way to go to diversify the perspectives in this line of research. Therefore, some suggestions or proposals are provided in the remainder of this paper.

Firstly, some Chinese researchers have conducted studies on the sustainable development of resource-based cities. The existing studies in this line of research, however, mainly focus on society, economy, resources and environment and choose related indexes as the evaluative standards, while regardless of the unique attributes of the resource-based cities. For example, there are different requirements for different stages of the sustainable

development. When embarking on the study of sustainable development of the resources-based cities, it is a necessity to gain a better knowledge of the causes of the resource exhaustion and the background of the transformation. On top of it, the government must take into consideration the healthy and sustainable development of the ecosystem, the reasonable utilization of the productive factors, the comprehensiveness of the urban development and the coordinated development of resources and environment and so on.

Secondly, many studies on the development of resource-based cities have centered on the macro development of the cities, involving such aspects as the sustainable development of economic and social environment in the resource-based cities and the modes of economic transformation. Some researchers have also conducted case studies which have a close look at a single resource-based city. Few of these studies, however, have paid due heed to the mechanism concerning the transformation of resource-based cities. As is known, theory is the solid foundation for practice, so future studies need to try to consolidate the theoretical basis in this line of research.

Thirdly, a review of the literature reveals that descriptive and qualitative methodology has predominated in the large volume of literature while few quantitative studies have emerged. Moreover, research in this domain is of a uni-dimensional flavor, centering mainly on the economic factors and ignoring the social and ecological perspectives. The systematic theoretic study on the transformation of the resource-based cities has not been well shaped, which urges the future studies to adopt a theory-based and quantitative study method to deepen the exploration of the trans-formative modes of the resource-based cities.

Fourthly, among the existing studies, besides the qualitative studies, there are some studies which have applied the dissipative structure theory and sustainable theory to discuss the transformation and the sustainable development of the resource-based cities. Based on the characteristics of the resource-based cities, apart from the important strategic role played by the energy supply, the social and ecological effects, ecological security and the economic transformation under social stability are the problems for the resource-exhausted cities to cope with. Future studies should employ a combination of qualitative and quantitative research methods to assess the developmental sustainability of the urban transformation on the basis of the analysis of the transformation mechanism. Moreover, a wide range of research methods should be adopted such as a mixture of qualitative and quantitative methods, ecology-oriented methods, comprehensive evaluation method of index system and the theory of dissipative structure, with an aim to enrich and diversify the study methods in this line of research and to evaluate and guide the sustainable development of the resources-based cities in a more systematic manner.

CONCLUSION

Due to the limitation and un-renewable nature of mineral resources, the sustainable development of resource-based cities must transform for survival, and avoid the situation of "exhaustion of minerals and death of a city". However, in this research area, the issues of resource restraint, economic recession and outstanding social conflicts make the resource-based cities encounter many difficulties during the transition, in order to ensure the sustainability of transitional development, the tracing of the sustainability of transitional development for the resource-exhausted cities has profound significance for the testing of city transition effect, finding the problems existing in the transitional development process, and adjusting the thinking of transition which should be paid more attention.

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