

## Research on the Countermeasures of the Development of Industrial Agglomeration District in Henan Province of China \*

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**Abstract** By using the methods of theoretical research and empirical study, the paper put forward the concept of industry innovation, and considered that industry innovation can be divided into three models, namely the progressive industry innovation, the fundamental industry innovation and the industrial convergence type of industrial innovation. Through analyzing the existing problems in the development of industrial agglomeration districts in Henan province, this article comes to the conclusion that each industrial agglomeration district should select right leading industries, proportionately develop related industries, form a relatively complete industrial network system, strengthen the technical and economic linkages between industries and, it industrial innovation continuously carry out on the basis of existing industries.

**Key words** Industrial innovation; Industrial transfer; Industrial agglomeration district; Henan province; Financial crisis

### 1 Introduction

With the increasingly outstanding of the innovative role, the central and local governments of China all understand innovation at the strategic height. Innovation is not merely the behavior of enterprise, but a cooperative behavior between countries and industries. The industrial innovation between national innovation and enterprise innovation is an important way for promoting the transformation of industrial economic growth mode and implementing the adjustment of industrial structure, and it is also the only way for improving competitiveness and technological innovation capability of industry. Industrial innovation is an important research area possessing the background of times. The activities of industrial innovation show the characteristics of integrated, systematic, multileveled and practical features, and for long-term development of China, it also has an important strategic significance. In 2008, the global financial crisis has brought a heavy blow to our economy, and Henan province cannot cultivate one's own moral worth in this crisis. As a big agricultural province, the industrial base of Henan province is still weak, and phenomenon of low industrial level and unreasonable industrial structure in Henan province is prominent, therefore, the influence of this crisis on Henan province presents characteristics of "come late, deep impact and go late", which are related to the level of economic development and industrial structure. Under the background of vigorously adjusting industrial structure, implementing industrial transfer and promoting industrial upgrading throughout the country, how can Henan province take the industrial agglomeration districts as the carrier and industrial innovation as the guiding ideology to seize the opportunity, undertake foreign and domestic industrial transfer and optimize industrial structure, then enhance their competitiveness has already become the urgent matter at the moment.

### 2 Literature Review of Industrial Innovation

At present, China is strongly advocating the building of innovation-oriented country, which has drawn more and more attention of many scholars on national innovation. But for the industrial innovation between enterprise innovation and national innovation, the related researches are still little. After this crisis, all countries in the world are working on the industrial structure adjustment and industrial upgrade, so under this background, the industrial innovation becomes the focus of theoretical research.

#### 2.1 The connotation of industrial innovation

The understanding of innovation is to discuss the role of technology innovation in the process of economic development mainly from the perspective of the combination of technology and economy, the

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\* Supported by the soft science project of Henan province: Research on strategies to accelerate the development of industrial agglomeration districts relying on science and technology innovation (Item number: 092400440019)

main representative is the presenter of modern innovation theory, Joseph Schumpeter. Based on his innovation theory, many scholars have conducted depth studies on enterprise innovation and also achieved fruitful results.

Hu Shuhua et al<sup>[1]</sup> concluded that the narrow sense of industrial innovation refers to the innovation subjects (government, enterprises, et al) achieved breakthrough progress of industry and considerably increase of enterprise competitiveness on the basis of technology innovation, and the general industrial innovation refers to that the innovation subjects cultivated new industries, or made the original industry take the lead in certain areas, or obtained the unprecedented development by system innovation, technological innovation, organization innovation and management innovation. Gerrit Rooks et al<sup>[2]</sup> pointed out that innovation is change. Industrial innovation refers to that there appear new or upgraded products, services or production processes in the process of industrial development. So that the industry innovation is divided into two types: incremental innovation and radical innovation. Marian Beise et al<sup>[3]</sup> thought the industrial innovation is the result of product innovation and process innovation which are achieved by the successful technology transfer of technology from public research institutions to enterprises. Lu Guoqing<sup>[4]</sup> reported that the industrial innovation is to break the constraints of structured industry for enterprises, and change the existing industrial structure or create new industrial process by technological innovation, product innovation, market innovation or combinatorial innovation. Luo Jizheng<sup>[5]</sup> defined the industrial innovation as that in the growth process of industry or in the fierce international competition environment, several large-scale enterprises actively conducted R&D activity or single leading companies in technology achieved common innovation within the industry by technology diffusion. Zhang Yaohui<sup>[6]</sup> concluded that industrial innovation is to meet the demands by use of new product and new technology, and the result is the formation of a new industry. Industrial innovation is the whole innovation of the industry rather than the local innovation; therefore, it includes two processes of the technological innovation in enterprise and technology diffusion within industry. So when the technical innovation is popularized within the industry, it can realize the industrial innovation. Joy Chandler et al<sup>[7]</sup> considered that industrial innovation is a company-wide dedication to delivering ever-increasing value to one's customers. They also pointed that successful industrial innovation must integrate three corporate arenas in the big picture: technology development, product development and, of equal importance, market development. Alan Macpherson<sup>[8]</sup> thought industrial innovation is that enterprises carry out mutual cooperation activities with the enterprises in the same industry or different upstream and downstream industrial chains to enhance the competitiveness of each other. Industrial innovation<sup>[9]</sup> is a complicated process that involves a lot of sub processes ranging from the choice of innovation sources and new ideas, to the realization of economic profit in market.

Though the concept of industrial innovation does not have a strict definition, but the related researches are overall described from the influence factors, implementation methods or the aims of industrial innovation. We concludes that the industrial innovation is the continuation and upgrading of enterprise innovation, and the innovation subjects achieves upgrading of original industry or creates a new industry by use of various management method and the integration of various resources, or produces an industry which is different from each other as well as interrelated to each other through the convergence of related industries.

## 2.2 The mode of industrial innovation

Based on the different discussion on the connotation of industrial innovation, domestic scholars have concluded many different industrial innovation modes according to their empirical researches. Liu Shuguang et al<sup>[10]</sup> divided the pattern of industrial innovation into independent innovation, imitation innovation and cooperation innovation according to the relationship between enterprise and innovation system, and also pointed out that the Silicon Valley, Tsukuba of Japan and the European Union are representatives of this three kinds of innovation patterns. Zheng Xisheng et al<sup>[11]</sup> divided the modes of industrial innovation into three modes of relying on research institutes, universities and enterprises based on the focus of industrial innovation. Yi Jiangneng et al<sup>[12]</sup> divided the pattern of industrial innovation into two categories of creating new ability and creating new industries from the view of creative means. Wang Xiuting<sup>[13]</sup> summarized four main modes of foreign industrial innovation, namely, technology-push model, policy-pull model, business linkage model and environment-driven model, and on this basis she analyzed the necessity and urgency of industrial Innovation of China. Zhang Yaohui<sup>[6]</sup> summarized the industrial innovation pattern as two kinds from the perspective of technical innovation: one kind is that technology visionaries in the industry first accomplish the product innovation, and thus lead to the related technical innovation and management innovation which exerted inductive influence on the other enterprises, and attract other enterprises to follow them, then make technology spread to

other enterprises, and finally form a new industry; The other one is that many enterprises realize the synchronous innovation, respectively complete the technological innovation required by industrial innovation, enter in the new industry at the same time, support each other and form an overall industry, and they also monopolize local technology because of their own innovation, and make the use of resources more concentrated owing to division, which ensure the enterprise can quickly gain the scale effect and make the industry innovation be quickly finished.

To divide the industrial innovation mode from the perspective of technology innovation and taking different participating subjects as the criteria has been endorsed by many scholars, because it not only pointed out different ways of industrial innovation, but also pointed out the innovation path. In the final analysis, the essence of industrial innovation is technology innovation; therefore, we can divide the industrial innovation modes into three types according to the advancement of technology and the effect degree on industry:

(1) Progressive industry innovation. This industrial innovation mode is to carry out partial adjustment and innovation to the existing industry, make the industry go up along the industry chain, and then realize industrial upgrading. For industry itself or the relationship between upstream and downstream industries, this change in the microscopic performance is very novel, only leading to a slight change to industry or market.

(2) Fundamental industry innovation. This industrial innovation pattern refers to that driven by the science and technology which have a great breakthrough, the cured pattern of existing industry was creatively destructed and formed a new kind of industry pattern, which caused the adjustment of industrial structure and the tremendous changes of market.

(3) Industrial convergence type of industrial innovation. This kind of industrial innovation mode refers to that in the connection of public technology, relevant industries break the original industrial bounds, permeate each other, thus strengthen the competition and cooperation between relevant industries, upgrade the traditional industries, realize the industry innovation and cultivate new growth point.

### **3 The Current Developing Situation of Industrial Agglomeration Districts in Henan Province**

The industrial agglomeration district is the organic integration of industry and district. It takes the high density agglomeration of industry as the inherent regularity and takes the region as space carrier, and it is also a new and efficient industrial organization form, and becomes the main trend of future industry development. Therefore, in order to achieve the “two big cross” and boost the central rise, Henan province explicitly put forward that the industry agglomeration area is the foundation engineering to optimize the industrial structure, transform the developmental pattern and realize the intensive development, and it is the effective carrier to construct the modern industrial system, modern urban system and independent innovation system.

At present, Henan province has made great achievements in the development of industrial agglomeration districts and formed many characteristic industrial clusters in food processing, machinery manufacturing, ceramic, textile, garments, chemical medicine, auto parts, metallurgy, coal and many other industries. For example, the food processing industry in Luohe city of Henan Province, the lifting equipment industry in Changyuan and the power equipment manufacturing industry in Xuchang, all these clusters have strong competitiveness. On this basis, Henan province carried out standardized integration to the 312 industrial agglomeration districts in December 2008, initially identified the spatial layout of 175 agglomeration districts which uniformly and basically distributed in each city of Henan province (seen in table 1), in which there are 4 agglomeration districts relying on the state-level development zone which are distributed in Zhengzhou and Luoyang, 22 agglomeration districts relying on provincial development zone, and 85% in the rest also relying on municipal or county development zone. Among them, there are 8 high-tech industry agglomeration districts, mainly being distributed in Zhengzhou, Luoyang, Nanyang, Xinxiang, et al. There are 23 clearly positioned industry agglomeration districts, and the rest are all comprehensive industrial parks.

To better promote the construction and development of industrial agglomeration in Henan province, the government deployed the unified plan and proposed “Guidelines on Accelerating the Scientific Development of Industrial Agglomeration Districts in Henan Province”, which definitely put forward that “Until 2012, strive to cultivate two or three industrial agglomeration districts possessing 100 billion Yuan of business income, ten industrial agglomeration districts possessing 50 billion Yuan of business

income, and fifty industrial agglomeration districts possessing 10 billion Yuan of business income". Up to May 2009, all levels of finances in Henan province have invested 4.358 billion Yuan of company capital, 122 county (city, area) governments invested 30.9 billion, and 175 industrial agglomeration districts completed 68.73 billion Yuan of fixed investment.

**Table 1 The Distribution of Industrial Agglomeration Districts in Henan Province**

	<i>A</i>	<i>B</i>	<i>C</i>		<i>A</i>	<i>B</i>	<i>C</i>
Luoyang	17	9	16	Anyang	9	5	9
Xinyang	15	8	10	Kaifeng	8	5	10
Zhengzhou	14	6	12	Puyang	8	5	6
Xinxiang	13	7	11	Xuchang	8	5	6
Nanyang	13	11	13	Jiaozuo	7	6	10
Zhumadian	12	9	10	Sanmenxia	7	5	6
Shangqiu	11	7	9	Luohe	5	2	5
Zhoukou	11	9	10	Hebi	4	2	6
Pingdingshan	10	6	10	Jiyuan	3	1	1

Source: Xia Nankai. The theory and practice of industrial agglomeration districts. The conference materials of the construction of Henan industrial agglomeration districts, Zhengzhou, 2009, 6, 22 (*A*: number of industrial agglomeration districts; *B*: number of county and city; *C*: number of county, city and district)

## 4 Industrial Innovation and the Development of Industrial Agglomeration District in Henan Province

### 4.1 The problems in the development of industrial agglomeration district in Henan Province

After several years of development, the construction of industrial agglomeration district in Henan Province has achieved remarkable results, and its effect on economic growth becomes increasingly obvious. Some industrial agglomeration districts with faster development all have relatively definite leading industry position, and with their own unique advantages, they attract a large number of well-known enterprises at home and abroad, forming a relatively rational industrial structure and improving their own industrial competitiveness. But the development of most industrial agglomeration districts is still exposed to many problems:

The platform, industrial agglomeration district, has not been fully built up. In addition to technology, markets and resources, the supporting infrastructure and complete industrial service system are also major factors in attracting business to move into the industrial agglomeration district. The infrastructure in most industrial agglomeration areas in Henan Province lags behind, and some even can not solve the water and electricity problems; another prominent issue is the imperfect industry service system. Because the economic development of the resident regions of most industrial agglomeration areas is very backward, the development of external service industry, including finance, R&D, marketing and others, is also relatively backward. For example, some areas have no one commercial bank except for the four major state banks, which will cause great difficulties to the financing of SMEs.

The driving ability of leading industries in the region is inadequate, the industrial structure is irrational, and the industry correlation is too low. The leading industry in many industrial agglomeration districts is not clear, and some even have no leading industries, and what they have are some small irrelevant businesses scattered in the cluster. Most industries in the industrial agglomeration region are traditional type or resource-dependent industries, but few high-tech industries. This will inevitably lead to the regional low-end products, low value-added products, severe resources and energy consumption and serious pollution in the manufacturing process, resulting in a lower level of industrial structure. This type of industrial agglomeration district can not form competitiveness.

The innovation support network has not been formed in the region, so the upgrade of industry and the sustainable competitiveness are restricted. The greatest advantage of the clusters is the formation of innovation networks and the generation of knowledge spillovers and technology spillovers. But the development of most industrial agglomeration districts in Henan Province is in the initial stage, so their starting point of industrial development is low and their scale is small, and lack of strength in talents, capital and technology. The industry association among enterprises is not strong, the innovation and cooperation consciousness between enterprises is weak, and there is lack of innovation support mechanism for each other, so the diffusion of knowledge and technology is very limited.

### 4.2 Countermeasures to speed up the development of industrial agglomeration districts relying on industrial innovation

Because of the above problems existing in the development process of industrial agglomeration districts in Henan Province, in the new round of undertaking industry transfer process, only with

constant industrial innovation, and using it as the guiding ideology to penetrate the whole process of the development of industrial agglomeration area, can they continuously improve the capability of industry technological learning and independent innovation, effectively use the development opportunities brought by the industry transfer, to achieve the sustainable economic development.

Firstly, each industrial agglomeration area should select and cultivate right leading industries based on its geographical advantages and natural resources, and enhance its leading role. In this round of industry transfer, there are both the transfer of traditional resource-based industries and the shift of modern capital-based and knowledge-based new industries. Each industrial agglomeration area should choose the industry which has a relatively good prospect for development and best suits to themselves according to their own advantages, and could not blindly import industries and just seek quality not quantity. The development of leading industries can not only improve the industry's key technologies, but also can speed up the development and diffusion of relevant technologies, which can increase the possibility of industrial innovation, and thus promote the integrated development of industry.

Secondly, walk out of the misunderstanding to industry transfer through industrial innovation. Simple industry transfer can not naturally promote the upgrading of the local industry and technological progress, on the contrary, if the industrial agglomeration district can not carry out industrial innovation based on the introduced industry, industrial transfer will promote the long-term presence of industry and technology gaps between developed countries or regions and developing countries or regions. If they can not form the ability of independent innovation for a long time, it may solidify the gap of industrial technology between them. Therefore, only on the basis of the existing industry, through industrial innovation to promote the upgrading of the existing industry and the integration with other related industries, can the competitiveness of industrial agglomeration districts be improved continuously.

Furthermore, accelerate the coordinated development of modern new industries relying on traditional industries. Traditional industries are the foundation of economic development in the region, so it should receive much attention continuously. But it is unwise to put all weights of economic development on the traditional industries, or use all resources in traditional industries, we should keep continuous upgrading of traditional industries using the idea of industrial innovation, develop modern emerging industry at the same time and achieve coordinated development of industries.

Finally, strengthen the division and cooperation of industries within the industrial agglomeration district. Strengthening the collaborative relationship based on the professional division of work is for extending the industrial chain and promoting technical and economic linkages between industries in region. The final goal is to establish an industry network with effective division and collaboration, boost the development of related industries by agglomeration economy and multiplier effect, and enhance the industrial development level in agglomeration region.

## 5 Conclusions

Based on the elaboration on the connotation and mode of industrial innovation, this article firstly put forward that industrial innovation is an important way to promote the transformation of industrial economic growth mode and implement the adjustment of industrial structure. And it is also the only way to improve the competitiveness and the technological innovation capability of industry. Then combined with field investigation, the paper analyzed the current situation and the existing problems in the development of industrial agglomeration area in Henan province; Finally, some corresponding policy suggestions were proposed from the perspective of industrial innovation: Each industrial agglomeration district should select right leading industries based on its own advantages, proportionately develop related industries driven by the leading industry and finally form a relatively complete industrial network system. In addition, the agglomeration district should also strengthen the linkages between industries and the optimization of industrial structure. More important is to strengthen the technical and economic links between industries and continuously carry out industrial innovation on the basis of existing industries, which is the only way to gain the sustainable competitive advantages of regional economic growth.

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