

Application On Planning and Operation of Spatial Information Technology in Industrial Technology Innovation Strategic Alliance

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Abstract

Supported by the spatial information technologies (SIT), this paper builds a database by integrating multi-source data like RS, spatial survey, economic statistics, etc., accomplishes the planning of ecological pattern of industrial technology innovation strategic alliance in gulf of Hangzhou area, and presents the strategies of constructing the operation mechanism of the industrial technology innovation strategic alliance in a bid to provide basis for the decision making of enhancing the innovation abilities of Chinese enterprises in this area.

Key words: *spatial information technologies, technology innovation, operation mechanism*

Thanks to the rapid development of China's economy and society, China's urbanization has made remarkable achievements. However, rapid urbanization has brought great pressure for the sustainable development of regions and cities. Such problems as similar industrial structure and overlapping regional investment have caused a deterioration in the ecological environment of urban economic and social development. Industrial technology innovation strategic alliance is an organization with enhancing the capabilities of industrial technology innovation as the goal, incorporating local government, research institutions, enterprises and institutions of higher education, using legal contracts as its guarantor. It seeks to develop jointly, complement each other, and share the resources and risks within the organization. [1] Ireland noted that more than 80% of the world's leading multi-national corporations will take alliance as the first strategic tool to develop the enterprise. [2] Practice in foreign countries shows that the industrial technology innovation strategic alliance is playing an increasingly significant role in the breakthrough of key technologies, upgrading industrial development and improvement of the core competitiveness of the enterprise. Gulf of Hangzhou area is the core area of Yangtze River Delta. It is one of the most developed areas in economics, technology and human resources in China. But as the local industrial structures converge and multinational corporations enhance their technology development, enterprises here and in China as a whole are confronted with strong competition and are in danger of being crushed in the new round of competition that features technology. Therefore, it is urgent for enterprises in this area to accelerate the upgrading of independent innovation abilities and their industries. Therefore, this paper applies spatial information technology in the evaluation and diagnosis of the current situation of urban ecological environment of the gulf of Hangzhou area, integrates cities' function orientation and selection of industries, scientifically plans an industrial technological innovation alliance in gulf of Hangzhou area in order to optimize the spatial allocation of urban industrial activities, and puts forward the construction ideas of the alliance operation mechanism.

1. Brief Review on Related Studies

Domestic and foreign scholars mainly focus the research on the following three aspects: First, the meaning and classification of strategic alliance of industrial technology innovation. The research on industrial technology innovation strategic alliance in foreign academia first began with the strategic alliance. In 1988, American scholars Weimer and Potter proposed the concept of strategic alliance. [3] After that, scholars Kent, Teece, Caldelra *etc.*, supplemented this concept, introducing it to industrial technology innovation, and put forward the concept of industrial technology innovation strategic alliance. [4] In 2008, China National Science and Technology Ministry and six other ministries collectively defined the concept of industrial technology innovation strategic alliance. Domestic scholars Zhao Zhiqian, Di Xiaoyan, *etc.*, outlined the connotation of it from the angles of alliance features, technological innovation, theoretical framework and so on. [5, 6] Second is the operation mechanism of the industrial technology innovation strategic alliance. The successful operation of it needs a scientific running mode, a highly trusted mechanism and a safeguard mechanism. Some scholars have analyzed the connotation of the operation mechanism of the industrial technology innovation alliance, and proposed the construction of the industrial technology innovation alliance operation mechanism. [7, 8] During the operation of the alliance, frictions among the members must be resolved and a trusted coordination mechanism among them must be established. Third are the influence factors on the industrial technology innovation strategic alliance. Harrigan believes that the similarity in technology and scale among partners is beneficial to improve the stability of the alliance. [9] Based on the characteristics of the partners, Sinha and his colleagues for the first time introduced the complementary features among partners into the research of alliance in the 20th century. [9] Through the analysis of the relationship among members of the technology innovation strategic alliance and their interaction, domestic scholars discussed the influence factors on knowledge sharing from the perspective of their technology resource level, the ability to organize learning, technology barrier property and the level of partnership. [10] Overall, there are some problems in the existing research: First, previous domestic research on the whole is limited to enterprise-level technology innovation strategic alliance, rarely involving regional level of industrial technology innovation strategic alliance construction. Little research related to local government policies on industrial technology innovation strategic alliance is done. To establish industrial technology innovation strategic alliance in gulf of Hangzhou area and to enhance the independent innovation abilities of the local Chinese enterprises, a new system needs to be designed. Second, research on industrial technology innovation strategic alliance by foreign scholars is mainly for developed countries, the empirical results of which do not necessarily apply to the situation of China. Third, research depth of the issues on the operation of the alliance including the power mechanism, the trust mechanism *etc.*, should be further strengthened. Therefore, this paper focuses on the objective necessity of building industrial technology innovation strategic alliance in gulf of Hangzhou area. Based on the governance theory and collaborative theory, it also proposes the ideas of constructing the operation mechanism of industrial technology innovation strategic alliance in this area.

2. Analysis on the Factors of Constructing Industrial Technology Innovation Strategic Alliance in Gulf of Hangzhou Area

2.1. Analysis on the Geographical Factors of Constructing Industrial Technology Innovation Strategic Alliance in Gulf of Hangzhou Area

2.1.1. Regional Economic Resource is Abundant: Regional advantages are obvious. Gulf of Hangzhou area includes 6 cities of Hangzhou, Ningbo, Shaoxing, Jiaxing, Huzhou

and Zhoushan. It is also closely linked to the “head” of Yangtze River Delta - Shanghai. The population and land area account for 51% and 44% respectively of the entire Zhejiang province. In 2014, the total GDP of the 6 cities reached 2740.27 billion RMB, accounting for 66.1% of the province, and ranked seventh among all provinces (municipalities and autonomous regions) in China. The level of urbanization has reached more than 50%. The 6 cities of gulf of Hangzhou area are among the top 100 cities in comprehensive competitiveness in the national city ranks, with Cixi, Yuyao, Zhuji, Haining, Tongxiang and other 12 counties (cities) among the top 100 counties. Featuring marine economy, Zhoushan islands is the 4th State Council approved national new district. A number of county-level cities have gained a dominant position in terms of industrial scale and production output value in the national and even global market. For example, the textile and chemical fiber of Xiaoshan and Shaoxing, leather tricot of Haining, Zhuji socks, Cixi household appliances, Shengzhou tie, Pinghu's clothing etc. Gulf of Hangzhou area has a well-developed transport network. The high-speed train from Shaoxing, going through Hangzhou and Shaoxing, will arrive at Ningbo in less than 90 minutes. It has 7 airports including Xiaoshan International Airport. Highways linking Hangzhou, Shanghai, Ningbo, Jiaxing, Pinghu, etc are densely interwoven. Gulf of Hangzhou Bridge and Jiashao Bridge have become transportation hubs. It also has considerable advantage in port resources. Beilun port of Ningbo is the 2nd largest deepwater port in China in terming of cargo handling capacity. It is also China's largest mine harbor and petrochemical port. Some islands in Zhoushan are suitable for the construction of large enterprises and port shoreline and berth.



Graph1: Industrial Technology Innovation Strategic Alliance in Gulf of Hangzhou Area

2.1.2. Science and Technology Education Resources are Rich. Large enterprises bring significant benefits. Gulf of Hangzhou area has a number of higher education institutions, the most famous of which is Zhejiang University. It could also utilize higher education resources in Shanghai. It has 27 State Council affiliated scientific research and development institutions, 3 national key laboratories, 3 key laboratories in key majors, the most famous of which are the Chinese Academy of Sciences Institute of the Yangtze River Delta and the State Oceanic Administration 2nd Marine Research Institute. In 2014, Gulf of Hangzhou Area received 75016 national

granted patents, accounting for 79.8% of Zhejiang province. It has over 10 state-level economic and technological development zones, 4 state-level high-tech industrial development zones and 1 national animation industry base. Two world top 500 enterprises Zhejiang Wuchan Corporation and Zhejiang Jili Corporation locate in this area. So are over 40 other China top 500 enterprises including Wanxiang Corporation. In 2013, the output from information products manufacturing industry exceeded 100 billion RMB. Alibaba, Netease and a number of Internet giants also locate here.

2.2. Analysis on the Strategic Factors of Constructing Industrial Technology Innovation Strategic Alliance in Gulf of Hangzhou Area

2.2.1. National Interests Require Accelerating the Construction of Industrial Technology Innovation Strategic Alliance: The global economic integration decides that the competition among enterprises is not just the confrontation between enterprises, but the competition among the core competitiveness of countries. As for the industrial common technologies, especially in the domestic blank fields, it is far from enough to rely on universities and enterprises to do the research and application. There is a market failure. The emergence of industrial clusters in gulf of Hangzhou area is completely spontaneous, driven by market forces, developed, changed, and integrated according to the principle of maximizing interests. Many industries have been involved. It is of critical importance to establish industrial standard, for it will impact the industrial ecological environment. Therefore, based on the need of national strategy and national interests, government needs to strengthen support and guidance in the construction of industrial technology innovation strategic alliance in gulf of Hangzhou area. It will not only solve the common problem of the industrial development, improve the economic efficiency of enterprises and tax credit, increase employment opportunities, but through this experience it will also lead industrial areas in other parts of the country to improve their enterprises' independent innovation abilities in the competition with multinational corporations, to help them get rid of the technical barriers from the developed countries and eventually it will improve China's say in international affairs. Take the joint research on high-speed train technology for example. It has changed China from a high speed train technology import countries to a high-speed train technology export power. It has also associated China closely with countries in need of this technology in the international arena.

2.2.2. Industrial Structure Transformation and Upgrading need the Strategic Alliance of Industrial Technology Innovation: The rapid economic growth of gulf of Hangzhou area is based on the high input and consumption of various resources, heavily relying on the increase of capital input to sustain. The resource utilization level is low. Economic structure upgrade and economic efficiency improvement are slow. Independent innovation abilities are weak. The product added value is low. Environmental pollution is serious. Led by government policies and driven by profits, the industries of the region are concentrated on the high value-added and profit abundant industries, resulting in the formation of a low level industrial structure and the homogenization of product structure. There is a low level of labor division and collaboration between enterprises in different cities. Intensive management in big scale is hard to achieve. At the same time, it also brings production capacity surplus and a vicious circle of beating down prices to win competition, resulting in a waste of resources and affecting economic growth quality and efficiency. Against the backdrop of limited resources, rising costs, structural changes, intensified market competition, macroeconomic regulation and control and corporate social responsibilities, the leading position in growth of gulf of Hangzhou area in the country gradually weakened. There is a pressing need to build regional industrial technology innovation strategic alliance. Based on regional comparative advantages and

characteristics of the local industries and products and guided by technological innovation, a reasonable allocation of regional resources can be achieved.



Graph2: Application of Spatial Information Technology in Industrial Technology Innovation Strategic Alliance in Gulf of Hangzhou Area

3. Construction of the Operational Mechanism of the Industrial Technology Innovation Strategic Alliance in Gulf of Hangzhou Area

Take geographical and strategic factors into consideration. Gulf of Hangzhou area needs to build a government led technology innovation strategic alliance, showing characteristics of high technology and high stability. Based on existing research and practical experience both from home and abroad, this paper puts forward a mechanism with a high level of trust, an internal governance mechanism, a knowledge transfer mechanism and a profit distribution mechanism for the alliance operation.

3.1. Construction of a Mechanism with a High Level of Trust for the Technological Innovation Strategic Alliance in Gulf of Hangzhou Area

The formation of technology innovation strategic alliance must be built on trust. A well developed trust mechanism can not only assure the alliance stability, but also can reduce the cost of alliance cooperation, which is also the key to run the alliance successfully. A trust mechanism must be founded on the publication of certain laws and regulations. The local government should promote the relevant legislation of industrial technology innovation strategic alliance and strive to build a law based trust security system. This will pave the way for the research and development of enterprises, universities and research institutions. A trust crisis is mostly caused by uneven distribution of information among members. The local government should strengthen the role of guiding, supervising and promoting a public information platform for the industrial technology innovation strategic alliance, enhance the exchange of information in a bid to realize the sharing of information and build the trust between the members. The local government should also speed up the cultivation of industrial organizations and intermediaries and help them develop their role in credit evaluation, so that they can be credible and can do the work of credit evaluation for members of the alliance.

3.2. Construction of an Internal Governance Mechanism for the Technological Innovation Strategic Alliance in Gulf of Hangzhou Area

Speculation can lead to the increase of transaction cost between members of the strategic alliance. If effective means of preventing speculation in the alliance cannot be taken, members will take into account the loss of key technologies and resources and will not be willing to to perform the responsibility, or take a negative attitude towards the instructions and assignments of the alliance. According to the view of traditional

economics, restricting speculation can be realized through the agreement of contract, the supervision and means of encouragement. Therefore, government in gulf of Hangzhou area should attach great importance to the research on the regional economic development status, keep a close tab on industrial competition and the research development of international advanced technologies and promote technological innovation activities among enterprises, universities and research institutes by signing agreements. It should accelerate the formulation of evaluation methods of technology innovation strategic alliance and the evaluation index system. Specific fiscal, taxation and financial policies and measures should be made for members of the alliance making technology innovations to promote the influx of science and technology capital and social capital into the alliance members. A risk compensation mechanism for scientific and technological research should be established and developed. The government should lead alliance members to build a risk compensation fund, which will provide appropriate subsidy to failed innovation projects.

3.3. Construction of a Knowledge Transfer Mechanism for the Technological Innovation Strategic Alliance in Gulf of Hangzhou Area

The main task of technological innovation strategic alliance is to implement knowledge transfer. Knowledge transfer is a key part for the alliance enterprises to obtain competitive advantage. Potential economic benefits being the direct driving force of knowledge transfer, government should fully express the significance of building technological innovation strategic alliance and acceleration of knowledge transfer so that scientific research institutions and universities will recognize the importance and take the initiative to fulfill their social responsibilities. Allow companies to see greater expectations of earnings so that they will actively participate in technological innovation activities. The innovation abilities among universities and research institutions are uneven. So are knowledge absorptive capacities of enterprises. The disparity among the alliance members could cause communication barrier. So different industries, enterprises of different scales should choose differently the technological innovation source. Government and science and technology intermediary organizations should facilitate knowledge exchange and transfer, guide and foster the matching of the knowledge exporting party and receiving party, and improve the innovation performance on new technologies and new products of both parties. Universities and research institutions should focus on their knowledge transfer capacity. Through the establishment of informal organizations with the knowledge exporting party, they should have a comprehensive review of the partners in the market environment, their organizational structure and technical barriers, identify knowledge gaps and promote the transfer of knowledge so that it will be easy for the receiving party to absorb.

3.4. Construction of a Profit Distribution Mechanism for the Technological Innovation Strategic Alliance in Gulf of Hangzhou Area

The profit distribution mechanism based on equivalence of rights and obligations is the foundation for the development of the strategic alliance. The relevant departments of Zhejiang provincial government should set up a permanent committee in the alliance, which will represent the government and will supervise the profit distribution among the members of the alliance. It will also witness the signing of contractual agreement on profit distribution. A proper evaluation should be conducted among all parties in the industrial technology innovation strategic alliance so as to make clear the distribution proportion of profit among the alliance members. Local government should standardize the pricing for technological results in law and play an active role in leading industrial organizations and intermediaries in technological results evaluation so as to give an accurate evaluation to technological results among alliance members. A responsibility sharing awareness should

be promoted among alliance members. A profit and risk sharing technical innovation mechanism should be established. The law is yardstick. The market is the method. Measures such as setting up supervision and reporting mechanism should be taken to properly supervise the profit distribution among the alliance members and to make sure an even distribution of profit from innovation is carried out among them.

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