Research on the Evolution of the Intergovernmental Cooperation Network in the Government Governance of China's National High-tech Zone

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Jinglei Wang, Jing Zhao*
Business College, Southwest University, Chongqing, China
***Corresponding author, email: jingzhao18@126.com**

Abstract

In the process of the construction and development of China's national high-tech zone, the number of government participation departments has been increasing, and the cooperation between governments has obvious characteristics of the times. From the perspective of the high-tech zone's science and technology innovation policy, this paper uses Ucinet to calculate the density and centrality of the intergovernmental cooperation network to reveal the dynamic characteristics of the evolution of the national high-tech zone's inter-governmental cooperation network based on the configuration of the cooperation network. The research shows that the morphological characteristics of the intergovernmental cooperation network of the national high-tech zone government have experienced a transformation process from a central-peripheral network to a decentralized network to a decentralized-coupled network. On this basis, further discussions were made on the high-tech zone organization support system in the evolution of the intergovernmental cooperation network. This article enriches the research on the government governance of the national high-tech zone and provides a reference for comprehensively examining the government's participation in the governance of science and technology parks.

Keywords

National High-tech zone; Intergovernmental cooperation; Network density; Centrality

Introduction

Regional science and technology innovation policy is the main tool to support regional innovation and development, and it has an important impact on the direction of regional innovation and the transformation of resource agglomeration. As the most important innovation entity for local development, the national high-tech zone can represent the local innovation level to a large extent. The creation, development and transformation of national high-tech zones run through the promulgation and implementation of a series of policies, which

are typical applications of national and local policy systems in regional innovation. The National High-tech Zone assumes an important innovation function, and the positive role of the science and technology innovation policy in it has been widely recognized. The participation of the government's governance role behind these policies is a question worthy of in-depth discussion. For this reason, this research mainly starts from the policy issuing organization, and comprehensively analyzes the evolution of the cooperation network of the national high-tech zone governance institu-tions, in order to be able to analyze the functional role played by the science and tech-nology innovation policy in the national high-tech zone innovation.

Literature Review and Method Model

Intergovernmental relations are an important subject of administrative system reform and institutional reform. The Chinese government has multiple levels and diverse func-tional departments, and interactions and frictions between governments are relatively frequent. When a job requires the participation of multiple levels of government and multiple departments, the cooperation and consultation and competition for resources in this field are more intense. More and more scholars pay attention to intergovernmental relations, and use intergovernmental relations as an entry point to investigate specific governance issues in a certain field, such as urban and rural construction (Chen & Tang, 2014), technological innovation (Huang et al, 2015), environmental governance (Ma & Suo, 2019) are all typical areas of research on intergovernmental relations. In essence, the study of intergovernmental relations refers to the interaction and game between dif-ferent institutions and departments on related issues in the process of public affairs governance, and it is directly reflected in the formation of policies. This study examines the cooperation between governments in the scientific and technological innovation of the national high-tech zone through the intergovernmental relations reflected in the policy text.

The three categories of research on intergovernmental relations include the vertical rela-tionship between the central and local governments, the horizontal relationship between functional departments, and the multiple relationships that cover social subjects (Xu, 2015). The research focus of different fields is different, and the appropriate research field should be selected according to the needs of the research field. Although innova-tion activities basically originate from market players, the management entities are mainly government departments in the field of technological innovation in high-tech zones. Therefore, this study limits the research scope of intergovernmental relations to government departments. In addition, the cooperation between government agencies has become closer and more complex, and the cooperation between governments has a trend of networking with the changes and needs of governance situations. The current gov-ernance is more networked. The network is the organizational model of the social gov-ernance mechanism, and it is also a specific perspective for investigating the relations between governments. The so-called inter-government network relationship includes both the vertical and horizontal relationships mentioned above, as well as the relation-ship between local governments and departments where there is no direct jurisdiction and subordination relationship, and as a whole, it exhibits a cross-over and diagonally intertwined configuration. Investigating the cooperation of governance institutions for technological innovation in high-tech zones from the perspective of intergovernmental network relations can better explore the characteristics of governance entities in techno-logical innovation in high-tech zones.

The basis of the study of intergovernmental network relations is social network analysis, and it mainly shows two research connotations. One is the location of a specific institu-tion and its social connections, and the other is the structure of the entire network and the closeness of ties and power allocation between all institutions in the network. It is the main research paradigm of intergovernmental network relations by integrating these elements logically and making their image embodied in a specific structural pattern. Ac-cording to the rights configuration attributes of the institutions in the network, the net-work relationship of governance institutions can be divided into three types: shared network, leadership network and administrative network (Provan & Kenis, 2008); on this basis, according to the cooperative characteristics of members, Three organizational co-operation structures have evolved: joint, lead, and support (Suo & Kan, 2019); in ad-dition, according to the number of "leaders" in the group lattice, network relationships can be divided into two forms: Single crystal core radiation type and polycrystalline core balanced type (Gao & Ding, 2018). These forms of cooperation network con-densed and summarized from different angles vividly show the characteristics of coop-eration between governments.

It is also a common method to use the density and centrality of the cooperative network to describe the network form in the social network relationship configuration (Kang, 2014). Among them, the network density is the ratio of the actual number of cooperative relations in the cooperative network to the theoretically possible maximum number of cooperative relations. It measures the distribution density of cooperative relations in the overall network, which can reflect the degree of closeness of the inter-government rela-tionship in the cooperative network. The centrality of the network is the tendency to concentrate on a certain actor in the cooperation network, which measures the influence of the actors in the cooperation relationship in the overall network, and can reflect the comparison of power between governments in the cooperation network. According to the network density and the centrality of the network, four cooperative network config-urations can be constructed (Wei Na et al, 2019): coordinated network, decentral-ized-coupled network, center-edge network, and loose network. The study used this to describe the morphological characteristics of the inter-governmental cooperation net-work in the technological innovation of the high-tech zone (Table 1).

Table 1. Intergovernmental Cooperation Network Configuration under Social Network Relations

		Network Centricity	
		High	Low
Network Density	High	coordinated network	decentralized-coupled network
	Low	center-edge network	loose network

The social network analysis method is a quantitative analysis method developed on the basis of mathematical algorithms and graph theory. There are many analysis tools, in-cluding Ucinet, Pajek, Gephi and so on. Among them, Ucinet is a commonly used so-cial network analysis software, which is suitable for static data processing. Because of its strong compatibility and powerful computing functions, it is more suitable for solv-ing complex problems with multiple relationships (Deng, 2014). It can use excel to compile the relationship matrix between different cooperative entities, import the rela-tionship matrix into Ucinet and use the Netdraw component to draw the network map. It uses the node size and connection thickness in the cooperation network to reflect the cooperation of the entities in the entire network. It calculates the network density and network central potential to reflect the morphological characteristics of the entire net-work.

The advancement of the national innovation strategy has a key impact on the innovation direction of the high-tech zone. In other words, the innovation and development of the national high-tech zone is also a targeted arrangement in response to the national inno-vation strategy. Therefore, the changes in the science and technology innovation policy of the national high-tech zone are directly affected by the evolution of the national inno-vation strategy.

This study divides China's national innovation strategy into four main stages: the first is the supremacy of scientific and technological productivity, marked by Deng Xiaoping's thesis in 1988 that science and technology are the primary productive forces; the second is the stage of the development strategy of rejuvenating the country through science and education, which was marked by the basic national policy of rejuvenating the country through science and education at the Fourth Session of the Eighth National People's Congress in 1996; the third is the strategic stage of building an innovative country, marked by the State Council's "Outline of the National Medium and Long-term Science and Technology Development Plan (2006-2020)" and the proposal to build an innova-tive country in2006; the fourth is the stage of innovation-driven development strategy, which is marked by the innovation-driven development strategy proposed at the 18th National Congress of the Communist Party of China held at the end of 2012. Then, in combination with the landmark time nodes of the four national innovation strategies, the evolution of the national high-tech zone science and technology innovation policy is di-vided into four stages: 1988-1995, 1996-2005, 2006-2012, 2013-2019. It can calculate the density and centrality of the intergovernmental cooperation network by extracting the policy issuing institutions in the corresponding time interval, and further reveal the dynamic characteristics of the evolution of the national high-tech zone intergovernmen-tal cooperation network.

The Evolution Process of the Cooperation Network of the National High-tech Zone Government Governance

The policy data collected in this article include the policies issued by the central gov-ernment and various ministries, provincial governments and their functional depart-ments, prefecture-level governments and their functional departments and other gov-ernment agencies. A total of 253 high-tech zone policy materials were retrieved from 1988 to 2019 through professional laws and regulations websites, government official websites and other channels.

Before the formal analysis, the extracted policy issuing agencies are preprocessed. The first is to change the name of the original institution to the name of the existing institu-tion in light of the past institutional reforms of the country. For example, the National Science and Technology Academic Committee is changed to the Ministry of Science and Technology. But the departments that have been completely abolished will not be changed, such as the National Economic System Reform Commission. The second is to treat the national high-tech zone innovation as an overall system, and the name of the local issuing organization is obscured, and only the administrative level or functional name is retained. The third is to modify the name of the same type of organization at the same level, and change the name of the government agency of the municipality and au-tonomous region to the name of the provincial government agency.

Analysis of the Characteristics of the Cooperation Network of the National High-tech Zone Government Governance from 1988 to 1995

There were 43 relevant policy documents on technological innovation in the national high-tech zone from 1988 to 1995, of which 40 were issued separately and only 3 were issued jointly. The 43 policy documents were issued jointly or individually by the State Council, the National Science and Technology Commission (which has been changed to the Ministry of Science and Technology), the National Economic System Reform Commission (which has been cancelled), the State Administration of Taxation, the Gen-eral Administration of Customs, and local provincial and municipal governments.

The three policy documents issued jointly were all issued by the State Commission for Economic Restructuring and the State Science and Technology Commission. This shows that it is supported by the scientific and technological innovation of the National Science and Technology Commission, and is also guaranteed by the system reform of the National Economic Reform Commission in the early 1990s. For example, the two major government departments jointly issued the "Decision on Deepening the Reform of High-tech Industrial Development Zones and Promoting the Development of High-tech Industries" in 1991. It is pointed out that it is necessary to liberate scientific and technological productivity to the greatest extent by establishing a system and mechanism that meets the development requirements of high-tech industries and inter-national practices. The provincial government (18) and the municipal government (16) are the institutions that publish more separate articles. This shows that under the guid-ance of the central government and ministries and commissions, the local government's status as the governing body of the national high-tech zone can be demonstrated through policy formulation. In addition, it is also worth noting that three separate doc-uments are issued by the State Administration of Taxation, all of which involve the issue of tax incentives for high-tech products in the National High-tech Zone.

Although the number of policy documents in this period accounted for more than 15% of the total number of policies, since the proportion of joint documents only accounted for 2.33% of the number of policies in the same period, only 6 pairs of in-ter-government departments were formed between the two government departments and five government departments did not participate in the cooperation network. Therefore, the inter-governmental cooperation network of the high-tech zone's science and tech-nology innovation policy has not yet been fully formed during this period. The network density of the prototype of the network is only 0.1429, indicating that the degree of co-operation between governments is relatively loose. The network centrality is 0.1667, indicating that there is no absolute network core node. From the dual indicators of net-work density and network centrality, the cooperative network should be a relatively loose network. However, from the perspective of individual network centrality, the network centrality of the National Economic Reform Commission and the National Science and Technology Commission (both are 3) is significantly higher than that of other government agencies (others are 0). These two departments form the core node of the actual cooperation network. Therefore, in the case of comprehensive consideration of the cooperation of the issuing agencies and the network map, the configuration of the inter-government cooperation network during this period can be revised to a cen-tral-edge network.

Analysis of the Characteristics of the Cooperation Network of the National High-tech Zone Government Governance from 1996 to 2005

The number of documents issued by upper-level departments of prefectural and munic-ipal governments and functional departments was 32 during the period 1996-2005. The number of policies in the past ten years did not increase significantly, but the total amount was lower than the number of policies in the previous eight years. Although the strategy of revitalizing the country through science and education has been proposed and implemented in depth, the stimulus effect on the total amount of national high-tech zone policies has not appeared. This may be due to the fact that the local governments that have established high-tech zones in the early stage have issued relevant policies, and on the other hand, because the number of newly approved high-tech zones during this period was small and failed to generate new policy needs. However, among the 32 policy documents, the number of government departments participating in the formula-tion reached 21, which is significantly more than the 7 in the previous period. The types of government departments are also more diverse, including the national construction department, foreign trade department, and local science and technology department, in-dustry and commerce departments have all participated in the policy formulation of the high-tech zone.

The number of policies jointly issued by government departments is 6, accounting for 18.75%, which is significantly higher than the 2.33% in the previous period. Among them, the number of joint issuing departments for a single document reached six, which were jointly issued by the Municipal Administration for Industry and Commerce, the Municipal Science and Technology Bureau, the Municipal Intellectual Property Office, the Municipal Radio, Film and Television Bureau, the High-tech Zone Management Committee. The joint release agency has a new feature, that is, the release agency is not limited to the government and its functional departments, the management committee of the high-tech zone, a management agency sent by the local government, is also involved in policy formulation. Multiple departments work together to standardize and support intellectual property work, which can guarantee the generation and transformation of intellectual property rights from multiple angles and directions. The government de-partments that have not participated in the cooperation network are mainly local people's governments and their general offices, including the provincial government, provincial government general offices, provincial human resources and social security bureaus, and municipal government general offices.

The number and share of joint publications during this period has increased significant-ly compared with the previous period. The number of network nodes has also increased from 2 to 17, and the number of cooperative relationships has reached 50 pairs.. The number of cooperative relationships of the Municipal Administration for Industry and Commerce, the Municipal Science and Technology Bureau, and the Municipal Intellec-tual Property Office, the Municipal Bureau of Radio, Film and Television, the Man-agement Committee of the High-tech Zone are all 5. There are 4 departments that are not involved in the cooperation network. Although the number of joint publications and the number of cooperative relationships are relatively large, due to the large number of de-partments involved in the formulation of science and technology innovation policies during this period, the theoretical maximum number of cooperative relationships is rela-tively large, resulting in a decrease in the actual network density compared to the previ-ous period. It is 0.1190, indicating that the cooperative relationship between government departments is very loose.

In order to clearly show the centrality of the publishing department, Ucinet is used to calculate the top 10 publishing organizations with absolute centrality at this stage (Table 2). The departments with the highest absolute centrality ranking are the Municipal Ad-ministration for Industry and Commerce, the Municipal Science and Technology Bureau, the Municipal Intellectual Property Office, the Municipal Radio, Film and Television Bureau, the High-tech Zone and the Economic Development Zone. They have a total of 30 relationships, with a relative centrality of 25.00%, and their respective shares are 0.10. The second place in absolute centrality is the Provincial Department of Science and Technology, the Provincial Department of Land and Resources, the Provincial Of-fice of Reform and Opening-up, and the Provincial Department of Construction. There are a total of 12 cooperative relationships with a relative centrality of 15% and a share of 0.06. Judging from the centralization trend of the entire network, the network centrality of the cooperative network is 0.1447, which is also lower than the previous period. There is no absolute core node in the network. Therefore, the network can be identified as a loose network in the intergovernmental cooperation network configuration at this stage.

Table 2. Analysis on the Centrality of the Issuing Department from 1996 to 2005

Issuing Department	Absolute Central-ity	Relative Central-ity	Share
Municipal Science and Technology Bureau	5.00	25.00%	0.10
Municipal Intellectual Property Office	5.00	25.00%	0.10
Municipal Administration for Industry and Com-merce	5.00	25.00%	0.10
Municipal Radio, Film and Television Bureau	5.00	25.00%	0.10
High-tech Zone	5.00	25.00%	0.10
Economic Development Zone	5.00	25.00%	0.10
Provincial Science and Technology Department	3.00	15.00%	0.06
Provincial Department of Land and Resources	3.00	15.00%	0.06
Provincial Construction Department	3.00	15.00%	0.06
Provincial Reform and Opening-up Office	3.00	15.00%	0.06

Analysis of the Characteristics of the Cooperation Network of the National High-tech Zone Government Governance from 2006 to 2012

With the increase in the number of new approvals for national high-tech zones and the implementation of innovative national strategies, the number of science and technology innovation policies in national high-tech zones has surged. The number of documents issued by above of the prefectural and municipal governments and functional depart-ments reached 95 during the period 2006-2012, which exceeded the sum of the number

of policies in the previous two phases. The formulation of policy documents is also more diverse. Compared with the previous two stages, new entities such as the Ministry of Human Resources and Social Security, the Ministry of Education, the Provincial Development and Reform Commission, and the Provincial Economic and Information Commission have participated in the intergovernmental cooperation network, and the types of policy entities have reached 47. On the whole, both the total amount of policies and the policy-making departments have increased significantly.

The number of policies jointly issued by government departments was 27, accounting for 28.42%; the subjects of joint publications reached 40 categories, accounting for more than 85% of the total types. It shows that the governance institutions of national high-tech zones became more and more diversified, and there were more and more co-operative behaviors of inter-departmental joint governance of scientific and technologi-cal innovation. It is worth mentioning that a document on several opinions on the con-struction of a special talent zone in Zhongguancun has as many as 17 joint publishing organizations. It was jointly formulated by 17 government departments including the Beijing Municipal Party Committee and Beijing Municipal Government, and issued by the Beijing Municipal Government. In addition, the number of policy documents issued separately during this period was 68. Among them, the number of policy documents issued separately by the main body that did not participate in the cooperation network was 10, including 3 from the Provincial Government Office, 1 from the Provincial De-partment of Human Resources and Social Security, 3 copies from the General Office of the Municipal Government, 1 copy from the Municipal Science and Technology Bureau, 1 copy from the Municipal Price Bureau, 1 copy from the Municipal Administration for Industry and Commerce.

During this period, the number of joint publications and joint publication departments increased significantly. The number of network nodes reached 40, and the number of cooperative relationships reached 564 pairs, which was more than 10 times that of the previous period. However, 7 departments did not participate in the cooperation network. Due to the large number of joint publications and cooperative relations at this stage, the density of the inter-government cooperation network has increased significantly com-pared with the previous period, reaching 0.2609, indicating that the cooperative relations between government departments have become closer.

The top 10 issuing organizations with absolute centrality at this stage are obtained through Ucinet calculations (Table 3). The departments with the highest absolute cen-trality rankings are the Ministry of Science and Technology, the Provincial Science and Technology Department, and the High-tech Zone, with a total of 90 cooperative rela-tionships. The relative centrality of the three departments is 10.87%, and the share is 0.053. The absolute centrality ranks next to the Ministry of Finance and the State Ad-ministration of Taxation. They have 58 cooperative relationships, with a relative central-ity of 10.51% and a share of 0.051. Judging from the centralization trend of the entire network, the network centrality of the cooperative network is 0.0681, which is signifi-cantly lower than the previous two stages, and there is no obvious core node formed in the network. According to the previous division of the configuration of the intergov-ernmental cooperation network, the configuration of the intergovernmental cooperation network at this stage can be determined to be a decentralized-coupling network.

Table 3. Analysis on the Centrality of the Issuing Department from 2006 to 2012

Issuing Department	Absolute Central-ity	Relative Central-ity	Share
Provincial Science and Technology Department	30.00	10.87%	0.053
Ministry of Science and Technology	30.00	10.87%	0.053
High-tech Zone	30.00	10.87%	0.053
Ministry of Finance	29.00	10.51%	0.051
State Administration of Taxation	29.00	10.51%	0.051
Provincial Government	28.00	10.15%	0.050
National Development and Reform Commission	28.00	10.15%	0.050
Provincial Department of Finance	26.00	9.42%	0.046
State Administration of Foreign Exchange	25.00	9.06%	0.044
Securities Regulatory Commission	25.00	9.06%	0.044

Analysis of the Characteristics of the Cooperation Network of the National High-tech Zone Government Governance from 2013 to 2019

During the period from 2013 to 2019, the number of documents was 83, and the poli-cy-making departments still maintained relatively high policy output. There are 35 types of departments of policy-making subjects, and two major changes have occurred: First, non-governmental organizations such as the China Association for Science and Tech-nology have emerged in joint departments, and non-governmental organizations and government departments have jointly issued policies to promote innovation in high-tech zones as a new phenomenon; The second is that the central government and the offices under the ministries and commissions as the main types of joint publications have in-creased, including the number of publications issued by the State-owned Assets Super-vision and Administration Commission of the State Council, the Department of Science and Technology of the Ministry of Education, and the Torch Center of the Ministry of Science and Technology. These two changes indicate that the main body for formulating the science and technology innovation policy of the national high-tech zone has begun to move downward, and the leading power of the innovation and development of the high-tech zone has begun to expand to a wider range of subjects.

Among a total of 83 documents, the number of policies jointly issued by government departments is 20, accounting for 24.1%, which is slightly lower than the previous stage; the subjects of jointly issued documents have reached 30 categories, accounting for more than the total type. 85.71%, which is slightly higher than the previous stage. It shows that the governance institutions of the National High-tech Zone were still rela-tively diverse, and there were also more cooperative behaviors in the joint governance of technological innovation among departments. By observing the joint issuing agencies of various documents, it is found that the number of jointly issued documents by the Ministry of Finance and the State Administration of Taxation is 5, and the

number of joint documents issued by the Provincial Department of Finance and the Provincial State Taxation Bureau is 3. It can be seen that there are more phenomena in the joint formulation of policies between the fiscal and taxation departments. In addition, the number of policy documents issued separately during this period was 63. Among them, the number of policies issued separately by the issuing entities who did not participate in the cooperation network reached 44, including 1 from the Torch Center of the Minis-try of Science and Technology, 6 from the General Office of the Provincial Government, 20 from the municipal government, 1 from the general office of the municipal govern-ment, and 16 from the office of the municipal government.

In the inter-government cooperation network, the number of network nodes in this pe-riod was 30, and five types of departments were not integrated into the cooperation network. The cooperative relationship in the cooperative network is 296 pairs, which is a decrease of nearly 300 pairs compared with the previous stage. The direct reason for the decrease in the number of partnerships is the decrease in the number of joint publi-cations and the decrease in the number of joint publication departments in a single document. However, due to the decrease in the number of types of cooperation depart-ments, the theoretical maximum number of cooperation has also decreased accordingly. Therefore, the density of the entire inter-governmental cooperation network has not de-creased significantly, still reaching 0.2487, and the cooperation between government departments remains relatively close.

Table 4 lists the top 10 issuing organizations in terms of absolute centrality at this stage. The department with the highest absolute centrality ranking is the high-tech zone, espe-cially represented by Zhongguancun, with an absolute centrality of 23, a relative central-ity of 13.53%, and a proportion of 0.078. The relative core positions in the cooperation network include the Ministry of Science and Technology and the Ministry of Finance. The number of cooperative relations between the two in the network is 21 and 18, and the relative centrality is 12.35% and 10.59%, accounting for 0.071 and 0.061 respec-tively. Because there are multiple nodes with similar centrality in the cooperative net-work, the centralization trend of the entire network is not obvious. The centrality of the network is 0.0907, and there is no absolute core node in the network. Integrating the density and central potential of the network, it can be judged that its network configura-tion is a de-centralized-coupled network.

Table 4. Analysis on the Centrality of the Issuing Department from 2013 to 2019

Issuing Department	Absolute Central-ity	Relative Central-ity	Share
High-tech Zone	23.00	13.53%	0.078
Ministry of Science and Tech-nology	21.00	12.35%	0.071
Ministry of Finance	18.00	10.59%	0.061
CPC Provincial Committee	17.00	10.00%	0.057
Organization Department of the CPC Central Committee	17.00	10.00%	0.057
Ministry of Public Security	17.00	10.00%	0.057
Provincial Government	17.00	10.00%	0.057
Ministry of Human Resourc-es and Social Security	17.00	10.00%	0.057

Provincial Department of Finance	16.00	9.41%	0.054
Provincial Science and Tech-nology Department	13.000	7.647	0.044

The High-tech Zone Organization Support System in the Evolution of the Intergovernmental Cooperation Network

During the more than 30 years of the construction and development of national high-tech zones, science and technology innovation policies have always been the focus of departments at all levels to focus on the construction of high-tech zones. The number of nodes and the number of cooperative relations in the inter-governmental cooperation network showed a trend of first increasing and then decreasing (Figure 1). The density of the network showed an overall upward trend, while the centrality of the network showed an overall

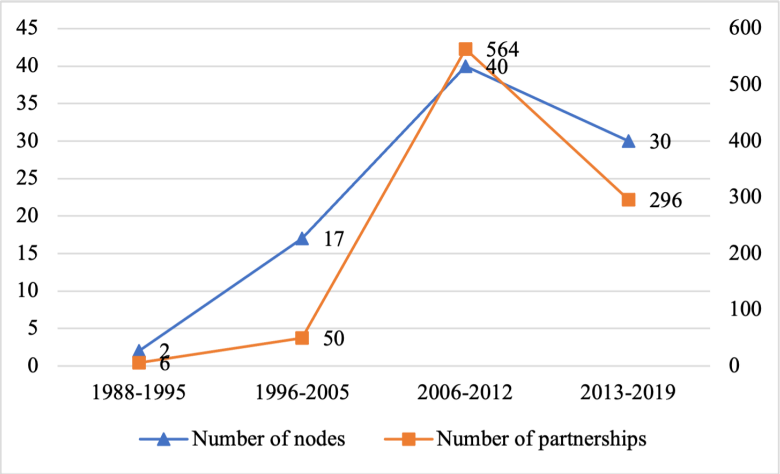


Figure 1. The Number of Nodes and the Number of Cooperation relationships in the Inter-governmental Cooperation Network of the National High-tech Zone from 1988 to 2019

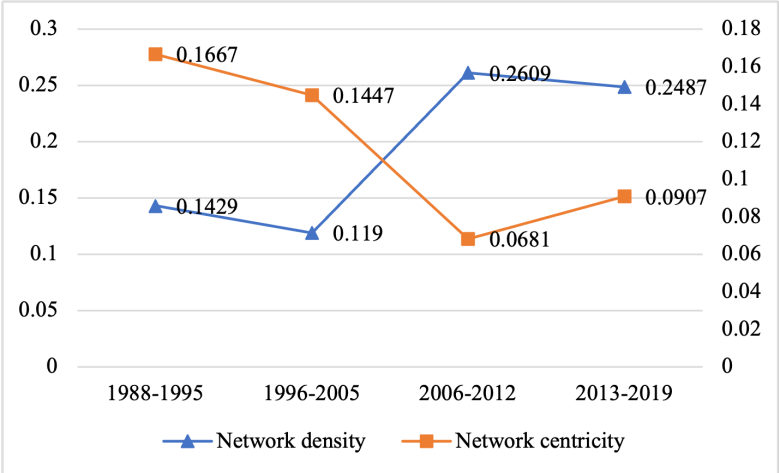


Figure 2. The Network Density and Centrality of the Intergovernmental Cooperation Net-work of the National High-tech Zone from 1988 to 2019

downward trend (Figure 2). The morphological characteristics of the intergovernmental cooperation network embodied in the science and technology innova-tion policy have gone through the evolution path of a center-edge network to a loose network, and then to a decentralized-coupled network, but it is far from reaching the state of a coordinated network.

It can be seen the changes in the organizational system of China's national high-tech zone management departments from the changes in the scientific and technological in-novation policy issuing departments and their cooperation networks,. At present, a grid-like organization support system is basically formed with central government reg-ulations, professional ministries and commissions guidance, and local governments dominates. At the beginning of the establishment of the high-tech zone, the State Coun-cil promulgated the first administrative regulations in 1991 to implement several policies and regulations on the construction of the high-tech zone, Including such aspects as preferential tariffs on import and export goods produced by high-tech products, produc-tion and operation of high-tech enterprises and tax refunds, and the establishment of convenient conditions for the gathering of highly educated talents. The departments supporting high-tech construction at the national level are mainly the National Science and Technology Commission, the State Economic Reform Commission and the State Administration of Taxation. The departments supporting the construction of high-tech zones at the local level are mainly provincial governments and sub-provincial city gov-ernments. Therefore, at this time, the level of support departments for the construction of high-tech zones is relatively high, and the organizational support system is relatively simple, presenting the characteristics of a vertical single system as a whole.

This relatively simple organizational support system has been maintained for about ten years. It was not until 2000 that more departments participated in the innovation and development of the high-tech zone. Human resources and social security, business ad-ministration, intellectual property and other innovative subdivision management de-partments have gradually entered the high-tech zone organization support system. In addition, the land and resources department, the development and reform department, and the construction department have also gradually participated in the formulation of the high-tech zone's science and technology innovation policy, providing various pe-ripheral service guarantees for the innovative development of the high-tech zone. In ad-dition to the increase in department types, the downward shift in the focus of manage-ment departments is also a significant change. The functional departments of the pro-vincial and municipal governments have begun to participate in policy formulation. These functional departments provide policy support for the high-tech zone under the joint management of the higher-level government and the professional departments of ministries and commissions. Therefore, the organizational support system of the high-tech zone has begun to expand in both vertical and horizontal directions, showing the characteristics of a matrix system.

With the acceleration of the innovation and development of the national high-tech zone and the need for transformation, the matrix organization system has begun to change. The main change is that from around 2010, the High-tech Zone Management Committee no longer acts as a single issuing agency, but instead jointly formulates policies with higher-level departments, and releases policies in the name of higher-level government departments to improve policy effectiveness. Among them, the Zhongguancun Science and Technology Park is a typical example. This change breaks the traditional mode of government departments managing high-tech zones. Government-sent agencies partici-pate in the cooperation network as the main body of development, and the organization support system of high-tech zones develops towards a grid.

Although the innovative inter-governmental cooperation network of the high-tech zone has undergone various changes, it has not yet reached a coordinated and coupled form. However, it can still be seen from the intergovernmental cooperation network from 1988 to 2019 that in the entire organizational support system, some departments play a key role from beginning to end. The first is the local government. Although high-tech zones are arranged and guided by the state, they are after all distributed in various provinces and prefecture-level cities. The innovation of high-tech zones can directly drive local economic development. Therefore, all local governments provide policy guidance on the innovation and transformation direction of the national high-tech zone. The next is the science and technology department. The Ministry of Science and Tech-nology, the Provincial Science and Technology Department, and the Municipal Science and Technology Bureau have all made policy explanations on the resource agglomera-tion and platform construction of the high-tech zone innovation. Therefore, in the grid-like organizational support system of the high-tech zone, there are major backbone departments such as local governments and science and technology departments. These departments are the backbone of the entire organizational support system and are con-nected to other departments to jointly support the innovation of the high-tech zone.

Conclusion and Suggestion

This article mainly studies the intergovernmental network of government governance in China's National High-tech Zone. Taking the high-tech innovation policies of the central government, ministries and commissions, provincial and municipal governments, and functional departments as the main research objects. 253 policies in the construction of high-tech zones have been sorted out through multiple channels. According to the four stages of the national innovation strategy upgrade iteration, the characteristics of the in-ter-governmental cooperation network in each stage are described in terms of network density and network centrality, and the evolution process of the inter-governmental network relationship of the government governance of the high-tech zone is summa-rized.

The results show that the morphological characteristics of the intergovernmental coop-eration network in the government governance of the high-tech zone have undergone a transition from a central-edge network to a decentralized network to a decentral-ized-coupled network. The government governance characteristics of the national high-tech zone's science and technology innovation policy generally follow the trend of changing from single governance to multiple governance, and from supportive policies to directional policies. This shows that the national high-tech zone's technological inno-vation is gradually shifting from low-end manufacturing to high-end R&D and the or-ganization support system of the entire region is gradually improving.

With the determination of the local government as the main body responsible for the development of high-tech zones and the enhancement of the autonomous deci-sion-making power of grassroots governments, local governments and functional de-partments at all levels should assume more responsibilities in the development of high-tech zones. The development of high-tech zones is constantly escalating, and in-novation and transformation are also imperative. The central and local departments should strengthen collaboration and promote the development of the coupling-type de-velopment of the cooperation network of governance institutions in high-tech zones. From the perspective of national innovation strategy, the future governance direction of high-tech zones should actively benchmark international technology development trends, and make efforts

in advanced manufacturing, smart industries and other industrial tech-nologies to meet the needs of domestic innovation-driven strategic development.

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