

Research on Network Governance Model of Collaborative Innovation Project

Liu Wei

Xidian University, School of Economics & Management, No. 2 South Taibai Road, Xi'an, Shaanxi, China

Abstract: *Collaborative Innovation Project has attracted much attention as an important way for China's economy to enter a new normal, and it has become a hot spot in the corporate and academic circles. Enterprise innovation projects need to cross the boundaries of the organization to acquire and utilize various resources and innovative knowledge for their own use, rather than just the individual innovation of the enterprise, and this multi-agent interaction and interaction to achieve the unified goal of the innovation project. Complex innovation organization and network innovation project management are particularly important. Therefore, from the perspective of network governance, combined with the network life cycle, the article dynamically explores the network structure of collaborative innovation projects, and proposes a network governance model for collaborative innovation projects, which provides a useful reference for improving project governance effectiveness.*

Keywords: Collaborative Innovation, Project governance, Network governance

1. Introduction

Collaborative innovation comes into being in the context of the gradual shift of innovation to a systematic and networked paradigm. With the advent of the era of knowledge economy, the accelerated development of science and technology, highly integrated technology, individual innovation activities, and even small-scale, single-level cooperation. Innovation has been difficult to meet the innovation needs of the project. In order to adapt to the changes of the times and improve the efficiency of innovation, the main body of innovation has become more and more dependent on complementary knowledge and external resources. The need for extensive exchanges and deep cooperation with other innovative entities is becoming more and more urgent. Taking colleges, enterprises, scientific research institutions as the core elements, government or industry intermediary organizations as the auxiliary elements, and through the multi-subjects to achieve unified innovation goals, complex innovation organizations and network innovation models quickly become the society. A new model of innovation and development. On the basis of combing the characteristics of collaborative innovation projects and related research on project governance, this paper combines the dynamic life cycle of the network, establishes the network governance framework model of collaborative innovation projects, and conducts network structure governance for core members and collaborative members in the network. Therefore, it proposes a network governance model that adapts to each stage of the collaborative innovation project network life cycle, and proposes strategies to provide a framework for network governance of collaborative innovation projects.

2. The new connotation of collaborative innovation network

China is in the critical period of transforming the mode of economic development. "Innovation 2.0", "Internet +" and "Industry 4.0" all reflect the development trend of the network driven by the Chinese government. With the in-depth

development of industry-university-research cooperation activities, the single-mode school-enterprise cooperation model can no longer meet the rapid development needs of innovation. It is necessary to break through the linear model from research results to industrialization, and realize parallel-based and even networked models(He Yubing, 2012)^[1]. It is precisely because collaborative innovation is a systematic innovation, each subject is interconnected and has the natural attributes of the network, and the academic community gradually proposes the concept of collaborative innovation network based on collaborative innovation research.

In the network environment, collaborative innovation has surpassed the boundaries of traditional "production, study and research". The collaborative innovation network breaks through the boundaries of enterprises as the main body, and develops toward the synergy of multiple actors such as industry, academic institutions, service organizations, and government agencies. The social relationship among the participating entities in the project constitutes a complex social network system, and different participants have different roles in the project social network. Liu Dan (2012)^[2] believes that the collaborative innovation network is a network-based collaborative innovation, and the collaborative innovation network is seen as a collaborative group of different innovation participants. Collaborative Innovation Networks ("Collaborative Innovation Networks" refers to "a network of self-motivated people to form a collective vision, through network communication ideas, information and work conditions, to achieve common goals."

Therefore, according to the definition of collaborative innovation network, it is characterized by complexity, dynamics, system, openness, centrality, synergy and sharing, enabling enterprises to cooperate through various technological innovations in the fierce market competition. It is an important way for enterprises to achieve innovation by integrating physical and non-physical exchanges to integrate internal and external resources, realizing resource sharing, knowledge transfer and technical collaboration, and finally

achieving the generation of innovation and maximizing benefits.

3. Collaborative innovation network governance

3.1 Network governance

The concept of network governance was originally proposed by Stephen Goldsmith and Weiai Gus. "Network governance is a brand-new governance model through the cooperation of corporate departments, non-profit organizations, for-profit organizations and other entities involved in providing public services." (Steven & Eggers, 2004) [3]. Gulat, Nohria & Za-heer (2000) [4] argue that network governance is a collection of selectable, persistent, and structured individuals composed of many independent firms. Peng Zhengyin [5] believes that network governance is a formal or informal organization and individual through the integration of economic contracts and the embedding of social relations, with the institutional arrangements between enterprises as the core of the relationship between the participants. Xue Chuanli [6] believes that network governance is defined as a coordinated and coordinated structure of production and transactions built by relevant business groups with specific objectives in the process of providing products and services. Xie Xuemei(2010) [7] defines the enterprise collaborative innovation network as a network formed through the interaction of contractual relationships with enterprises, scientific research institutions, higher education institutions, and government.

According to the way of participation in governance and whether it is implemented by middlemen, Peng Zhengyin(2013) [8] divides the network governance model into External Governance and Par-ticipant Governance. According to whether the network governance needs the subject and whether the subject comes from external or internal dimensions, Provan (2007) [9], the governance model is divided into three categories: joint governance, core corporate governance and third-party governance, and studies of networks in different contexts. The evolution of governance. Mueller (2012) [10] studied the role of network attributes and incentives in network governance, and also proposed two governance models: core corporate governance and third-party governance. Xie Yongping (2012) [11] believes that before the formation of core enterprises, member companies spontaneously compete and cooperate with others based on their own resources. In this process, core enterprises are gradually formed; After its formation, it is an interactive and collaborative network governance led by core enterprises based on networked design. According to the number of network members participating in governance, it can be divided into three modes: Shared Governance, Polycentric Governance, and Lead Organization Governance. According to the guiding mechanism, three governance networks of government-led, government-involved and self-organized (Yao Yinliang, Liu Bo, Wang Yingluo, 2010) [12] were constructed, and various specific governance models were formed.

At present, the research on network governance mode focuses on the static governance of the network, and does not combine the characteristics of dynamic network changes. It ensures that the efficient operation of the collaborative innovation network at each time is a major problem that all participants in the collaborative network must face. The choice of governance mode in each phase of the collaborative project network life cycle is especially important for network dynamic governance.

4. Collaborative Innovation Network Dynamic Governance Model

4.1 The formation of the network life cycle of collaborative innovation projects

The network of collaborative innovation projects still has the static and dynamic attributes of the network. The static attributes refer to the network and network organizations formed by the aggregation of members for common purposes, which cooperate and compete with each other; the dynamic attributes refer to the relevant Enterprises participate in the innovation activities in the network organization, and spontaneously form, dissolve or reorganize the community under the driving of common interests, forming a dynamic network structure. According to the characteristics of collaborative innovation projects and the basic attributes of the network, we define the network life cycle dynamics of collaborative innovation projects as: initial stage of collaborative innovation project network, collaborative innovation project network formation period, collaborative innovation project network stability period, collaborative innovation project network Consumption period.

4.2 Network Dynamic Governance Model of Collaborative Innovation Project

Combined with the change of network structure under the life cycle of collaborative innovation project network, this paper proposes a dynamic governance model of collaborative innovation project network, as shown in the figure 1:

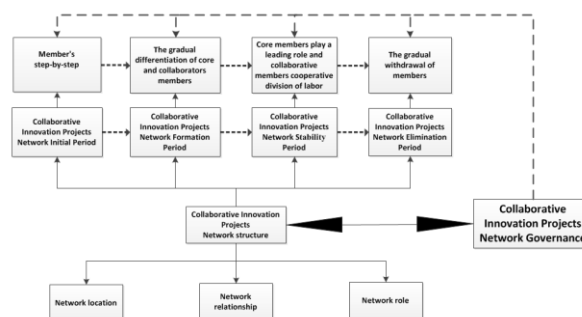


Figure 1: Dynamic Network Governance Model for Collaborative Innovation Projects

In the early stage of the collaborative innovation project network: With the establishment of collaborative innovation projects, the network members gradually joined, and the network location in this period was in the stage of small-scale network, but the growth rate was fast, the network density changed from small to large, and the network members were equal. The connection is not tight or prominent, and the

activities are based on contractual contracts. The centrality of the network is not obvious. At this point, the choice of leadership contract governance as the governance model of this stage, the project sponsor as a leader to lead the entire project, encourage partners who meet the project requirements to enter the collaborative innovation network, and contract management of members.

Collaborative innovation project network formation period: With the gradual participation of network members, the network scale reaches the expansion period, the growth rate begins to slow, the network locations of the nodes in the network are different, and the differences in the resources are uneven, which will inevitably lead to A small number of members of the network are growing faster than other members and become core members of the network. Any member of the network can use the resources in the network to use for itself, and constantly enhance their competitiveness and network status, and have the opportunity to grow into the core of the network. At this stage, there may be a small number of core members in the network, and the network with large differences in core members has weak competition. The weak core members often follow the strong members for innovation activities. With small differences in network, competition is fierce, and it is easy to introduce new core members to join the competition. After the competition of the members, they will not become members of the core enterprise, and will become the members of the collaboration and work together with the core members to complete the project. According to the strength difference of each core member, it will affect the influence of core members on the control of the network, leading to changes in the network's centrality and gradually gathering toward the core members. Membership interactions have increased interactions, information exchanges have been frequent, and membership roles have not been significant. This process is not the result of the game of a particular node, but the process of continuous improvement and evolution of the innovation capabilities of various participants such as time and space. Therefore, it is more likely to bring more effects to the network through spontaneous establishment of cooperative competition, and realize the free integration of similar resources and complementary resources of members in the network. At this point, choose shared relationship governance as the governance model for this phase. The so-called shared relationship governance refers to the equal rights of all members of the network organization to manage the network, and to govern the basic relationship between the members of the network, namely, competition and cooperation. The process of sharing the superior resources of the enterprise is the process of cooperation, and the process of enhancing the core competitiveness of the enterprise is the process of competition. The two mutually restrict each other, the mutual influence of cooperation is the means, the competition is the purpose, and jointly promote the improvement and core of the innovation performance of the innovation network. The formation of business.

Collaborative innovation project network stability period: As the core members of the network gradually form, the network scale reaches the maximum, the growth rate is basically zero, the membership relationship tends to be stable, the

membership role is formed, and the core members begin to make decisions, production and management of other members. Influencing and leading roles, and maintaining the stable development of the network through collaboration and interaction with collaborative members. The centrality of the network during this period is hard to change, and it is mostly played by core members. If there are multiple core members in the network, there is a certain difficulty in the cooperation between these core members, or may only be a certain degree of cooperation in a certain public domain, but compared to only one core member in the network, due to the nature of core members Different causes of differences in innovation direction, each of the core members may radiate to a certain extent, leading the collaborative innovation of the scope, and the detailed division of labor and cooperation can promote the professional sharing of knowledge in the network. At this time, multi-center core member governance is selected as the governance model of this stage, and multiple core members interact and cooperate with the collaborative members, so that the members' own goals are consistent with the overall goals of the network.

Collaborative innovation project network elimination period: As the project is nearing the end, the product is gradually delivered, and the members gradually withdraw. The network in this period begins to disappear, and the network density and center degree become drastically smaller. The role of the members began to change, the leadership of the core members gradually disappeared, the role of the platform appeared, and the members used the role of the third-party platform to play the project summary and technology promotion for the complete project delivery. At this point, third-party governance is selected as the governance model at this stage. Third-party organizations can be selected as middlemen. Third-party platforms can be formed by selecting the authority of network members to summarize and evaluate the project and contribute to follow-up cooperation and project governance.

5. Conclusion and Future Research Prospects

With the new era of collaborative innovation, collaboration with enterprises, universities, research institutions, governments, technology intermediaries, and related financial institutions has become the new innovation development paradigm, through the life cycle analysis of collaborative innovation project networks. In the different periods, the governance model of the dynamic network is analyzed and discussed, and the governance research combined with the dynamics of the network is formed, which has important reference for the network governance perspective of project governance. However, the model is only the result of theoretical analysis, and the follow-up needs to be applied in practical collaborative innovation projects and research evaluation.

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Author Profile



Liu wei received the B.S. degrees in electronic science and technology from Xi'an University of Posts & Telecommunications in 2006 and 2010, worked as a software engineer in 2010 and 2016. Now, Study for the master degree of project management in Xidian University, and research on Network Governance.