

A Review of Research on Knowledge Network Cohesion

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Abstract: The element of knowledge is always one of the core elements of enterprise innovation. With the development of science and technology innovation, the demand for high-quality innovation increases, and scholars at home and abroad gradually realize the role of knowledge management on innovation. Knowledge network cohesion can reflect the characteristics of enterprise knowledge, to better help people carry out knowledge management. Therefore, this paper discusses the conceptual connotation and dimensional division of knowledge network cohesion by summarizing the research related to knowledge network cohesion, with a view to expanding the relevant theoretical derivation of knowledge management.

Keywords: Knowledge Network Cohesion; Local Cohesion of Knowledge Network; Global Cohesion of Knowledge Network.

1. Introduction

Firm innovation is the reorganisation of knowledge elements and value re-creation, and improving the quality of firm innovation implies that its knowledge elements are not simply arranged in combinations, but rather that the optimal solution is chosen from a collection of possibilities (Kim et al., 2021). According to social network theory, knowledge diversity structures the magnitude and density of a firm's knowledge network, while knowledge network cohesion focuses on the structure and linkages among the elements within its network. Knowledge network cohesion refers to the characteristics of the network structure formed by the interconnection and interaction of knowledge elements, including the dimensions of local cohesion and global cohesion (Wang and Yang, 2019). Based on the absorptive capacity theory, it is known that the knowledge network base agglomeration of enterprises in a networked situation varies greatly, which may, to a certain extent, lead to the differential performance of their competitive ability, resource integration ability and knowledge absorption potential, and thus have an impact on the innovation results and quality of enterprises (Zahra et al., 2002). However, the research on knowledge network cohesion is still in the exploratory stage, and the questions of its essence, dimension and measurement need to be answered.

2. Overview of the Concept of Knowledge Network Cohesion

Since Gagne (1985) first proposed the concept of knowledge network, academics have gradually recognised this concept in combination with the field of management. Knowledge network is an activity based on technology production and knowledge exchange and dissemination, reflecting the process of exchange, transfer, transmission, and integration of knowledge elements. Dong and Yang (2016), based on the knowledge flow perspective, argue that knowledge network is the circulation of internal knowledge elements with information from the external environment, thus forming a knowledge network; Brennecke and Rank (2017) focus on the internal enterprise that in its technological innovation process, different types of knowledge elements as well as the linking relationships among the elements due to

knowledge coupling together structure the knowledge network.

Throughout the field of knowledge network research, although the research on its combination with management research context has matured, the current research on knowledge network cohesion is still an emerging hotspot. According to the resource dependence theory, it is known that knowledge itself can be regarded as a component element, and tapping into the interdependence between the elements and effectively configuring them are the key links to realising corporate innovation (Zhang and Wang, 2019; Kogut and Zander, 1992). Knowledge network cohesion can reflect the linkage structure and integration relationship of knowledge elements within the system, and its conceptual connotation can be elaborated from the cooperative network level and individual network level respectively. For the cooperation network level, Li and Yu (2018) suggest that knowledge network cohesion can portray the degree of interconnection and characteristics between the knowledge elements of an enterprise; Qiu et al. (2022) consider knowledge network cohesion as the corresponding expression of the network structure from the perspective of the cooperation network, and it can respond to the state of the cooperation relationship between the network subjects. They believe that knowledge network cohesion has the basic characteristics of reciprocity, continuity and frequency, which can stimulate and strengthen the trust between cooperative organisations, and then promote the exchange of knowledge and technology in cooperative networks. For the individual network level, Quatraro (2010), based on the knowledge reorganisation approach, argues that knowledge cohesion is represented as a network composed of interlinked knowledge elements, with each node in the network representing a possible combination of elements in the knowledge space, and the links indicating the actual combinations that are formed; and Shi and Sun (2022) argue that traditional team knowledge metrics have mostly been considered from the knowledge composition elements, ignoring the combination mode and the degree of association between elements, which also have an impact on corporate innovation; Hu et al. (2022), based on the absorptive capacity theory, suggest that the differences in the agglomeration of organisational knowledge bases in the networked context affect the organisation's competitiveness, its ability to integrate resources, and its potential for knowledge

absorption.

In summary, knowledge network cohesion is defined from the individual network level as the characteristics of network structure formed by the interconnection and interaction of knowledge elements in the corporate knowledge network.

3. Overview of Cohesive Dimensions of Knowledge Networks

Given that knowledge network cohesion is a relatively novel topic, it has not been explored much in the academic community. In this paper, we mainly refer to the current more unified way of dividing dimensions, i.e., knowledge network cohesion is divided into two dimensions, namely, local cohesion and global cohesion (Guler and Nerkar, 2012; Xu et al. 2019; Li and Yu 2018; Xu and Gong 2019; Hu et al. 2022).

3.1. Local Cohesion of Knowledge Network

Based on Guler and Nerkar's (2012) study, Li and Yu (2018), in their research on the structural holes in collaborative R&D networks, proposed that two R&D subjects in different positions have differently structured knowledge networks formed by the extensive linkages of elements in their internal knowledge networks, and that this network structural differentiation reflects the fact that the two subjects possess different types of knowledge network cohesion. They believe that local cohesion describes the degree of direct connection between each node within the network and its neighbouring nodes, mainly focusing on the network and the degree of closeness of the connection even if the nodes in the network are directly connected; similarly, Xu and Gong (2019) believe that local cohesion describes the degree of neighbourhood connectivity of some of the nodes in the network, i.e., the degree of clustering of nodes into a group; Hu et al. (2022), based on knowledge absorption theory, argue that local cohesion is the degree of direct connection between knowledge elements and other knowledge elements in their network, reflecting the enterprise's previous knowledge integration experience and the degree of specialisation of knowledge elements, and representing the enterprise's learning direction and technological development trajectory.

3.2. Global Cohesion of Knowledge Network

According to Li and Yu (2018), global cohesion portrays the degree of general connection between different nodes in a network, which differs from local cohesion in that the former describes the direct linkage of each knowledge element, while global cohesion focuses on the existence of linkages and their tightness among all knowledge nodes in a knowledge network. That is, a network may exhibit a loose structure at the overall level (i.e., lower global cohesion), but its local network may present a tightly linked structure (i.e., higher local cohesion); Hu et al. (2022) define global cohesion as the closeness of the links between knowledge elements in the overall knowledge network from the perspective of the knowledge base agglomeration, and they argue that global cohesion represents the overall knowledge network's density, which can reflect the comprehensive ability of enterprises to integrate heterogeneous technologies.

In summary, knowledge network cohesion is divided into two dimensions: local cohesion and global cohesion. Among them, local cohesion refers to the degree of direct connection between a knowledge element and other knowledge elements

in its knowledge network; global cohesion refers to the degree of interconnection between all knowledge elements in the knowledge network.

4. Overview of Knowledge Network Cohesion Mechanisms

As mentioned earlier, knowledge network cohesion, as a relatively new variable in the knowledge management perspective, has triggered extensive discussion among scholars about the role it plays in corporate innovation contexts.

Li and Yu (2018) empirically examined the mechanism of knowledge network cohesion on the exploratory innovation performance of enterprises based on structural holes theory and knowledge base view, and the impact of knowledge network cohesion on the relationship between structural holes of collaborative R&D networks and the exploratory innovation performance of enterprises using enterprise panel data of the automotive industry in China; Xu and Gong (2021) similarly utilised the enterprise panel data of China's automotive industry to also use enterprise panel data of China's automobile industry to analyse and verify the regulating mechanism of knowledge network cohesion and the direct relationship between knowledge network cohesion and enterprises' new product development performance; Hu et al. (2022) combine the theory of open innovation and the theory of knowledge base, and based on the non-equilibrium panel data of China's biotechnology field, empirically examine the regulating mechanism of knowledge network cohesion on the relationship between openness to innovation and enterprises' technological innovation.

5. Literature Review

In summary, the current research results of knowledge network cohesion at home and abroad have been deepening, especially in China, where several scholars have published their research on knowledge network cohesion in authoritative journals. Firstly, domestic and foreign scholars have reached a consensus on the basic issues such as the concept definition and dimension division of knowledge network cohesion, and believe that knowledge network cohesion reflects the degree of aggregation of enterprise knowledge elements in different scopes. Secondly, domestic scholars have also conducted some research on the mechanism of knowledge network cohesion.

However, since knowledge network cohesion is a relatively novel topic, it is still in the exploratory stage, and the related research literature is relatively small, and its research depth needs to be strengthened urgently. Some of the research conclusions take the cooperative innovation network as the main body of research, and the mechanism of its role in the innovation of a single enterprise has not been authoritatively proved, which is of great theoretical value for the in-depth understanding of the connotation of knowledge network cohesion, and therefore needs to be further researched and explored.

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